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SHAKESPEARE'S POEMS.

THOUGH I do not propose here to discuss the Baconian paradox, I touch upon it as giving interest to certain comparisons which I am about to make between the poems of Shakespeare and his plays. Even the most rabid Baconian, I imagine, does not deny that Shakespeare wrote "Venus and Adonis," "Lucrece," the Sonnets, the "Lover's Complaint," and parts of the "Passionate Pilgrim" (really a congeries of short poems, some of which were admittedly his, while others were as certainly the work of other men). Of course, the circumstance that in "Love's Labour Lost" some of these poems are actually introduced, would in no sort convince a paradoxist that the play was not Bacon's: for it is one of the charming characteristics of paradox that it can derive comfort from the most contradictory arguments. If we find a passage in Shakespeare which suggests Baconian thoughts, then we are asked, "Who but Bacon could have written that?" But if we find something which Bacon could not be supposed to have written, or, as in the present case, something which Shakespeare certainly wrote, then we are asked to admire the ingenuity with which Bacon masked his identity. Therefore I do not insist on the circumstance that, unless Bacon was a thief or Shakespeare a rogue (or preferably both), the appearance of unquestionably Shakespearean sonnets in one of Shakespeare's plays suffices to overthrow the Baconian theory. (In fact, who *wants* to overthrow it?—any more than a grown man would want to kick over the mud fortresses or the oyster grottoes of little children.) But the evidence of the Shakespearean mind, and especially of Shakespeare's specially dramatic power, shown in the poems which he certainly wrote, is well worth studying apart from any such fond fancies in regard to the plays. Nay, I may go so far as to admit that if some of the Baconian paradoxists should be led to study Shakespeare's poems (it is hopeless to urge them to study appreciatively Bacon's "Instauratio Magna" and "Novum Organum") this little essay would have served a useful purpose.

"Venus and Adonis" was probably written several years before 1593, when it was published. Shakespeare speaks of it as "the first heir of his invention," and it is certain that he had written other poems than this before 1593, for Spenser, in 1591, had praised Shakespeare's muse, "full of high thoughts' invention." It is thought by some that Shakespeare wrote this poem before he came to London—somewhere about 1586—but I imagine he had not much opportunity for poetic composition during the few years which he passed at Stratford after his much too early marriage (to a woman eight years his senior). Some of the softer touches of the wooing of Adonis by Venus may without malice be thought to have been memories of Ann Hathaway's wooing of the young poet, for when a woman of twenty-six, even the most charming, is wed too early, yet too late, by a boy of eighteen, one may usually suppose the woman the first to woo. And even in the coldness of Adonis the poet may have pictured in part his own boyish bashfulness, as where in the first sonnet of "The Passionate Pilgrim" he says:—

> But whether unripe years did want conceit,
> Or he refus'd to take her figur'd proffer,
> The tender nibbler would not touch the bait,
> But smile and jest at every tender offer.

The love of Phœbe for Rosalind in her disguise as the boy Ganymede suggests similar thoughts, though we must not profanely touch the Shakespearean drama, where Shakespeare the man scarce ever shows, but only Shakespeare the inspired creator of men.

The "Venus and Adonis," if marked by many faults, and painted throughout in too warm tints, yet contains clear evidence of the work of the Shakespeare of the plays. Here and there occur words and phrases, such as Shakespeare has elsewhere used almost unchanged. Thus, reproaching Adonis: "Ah, me!" quoth Venus, "young and so unkind"; as Lear to Cordelia: "So young and so untender." The descriptions, especially of animals, are such as are matched only in the plays. Consider, for instance, the description of the horse:—

> Look, when a painter would surpass the life,
> In limning out a well-proportion'd steed,
> His art with nature's workmanship at strife,
> As if the dead the living should exceed;
> So did this horse excel a common one,
> In shape and courage, colour, pace, and bone.
>
> Round-hoof'd, short-jointed, fetlocks shag and long,
> Broad breast, full eye, small head, and nostrils wide.
> High crest, short ears, straight legs, and passing strong,
> Thin mane, thick tail, broad buttock, tender hide.
> Look, what a horse should have he did not lack,
> Save a proud rider on so proud a back.

One may recognise the country-bred poet in the description of hunting sports, both of the more dangerous sort as in the boar hunt, and in the hunting of the weak hare:—

> Mark the poor wretch, to over-shoot his troubles,
> How he outruns the winds, and with what care
> He cranks and crosses with a thousand doubles:
> The many musets through the which he goes,
> Are like a labyrinth to amaze his foes.

(Note here and there throughout the poem the ease and grace of diction, the wide vocabulary, and the use of such words as Shakespeare the dramatist is fond of using—as, for instance, "He cranks and crosses," comparing with this Hotspur's remark that this river "comes me cranking in.")

In the following passage we recognise Shakespeare's knowledge of animal ways (is there no paradoxist prepared to recognise some huntsman or veterinary surgeon of Elizabeth's time as the author of the plays?), and in "caitiff," "venom'd," "sovereign" (adjectively), "ill-resounding," "welkin," "volleys," we note the Shakespearean vocabulary:—

> Here kennel'd in a brake she finds a hound,
> And asks the weary caitiff for his master;
> And there another licking of his wounds
> 'Gainst venom'd wounds the only sovereign plaster;
> And here she meets another sadly scowling,
> To whom she speaks, and he replies with howling.
>
> When he hath ceas'd his ill-resounding noise,
> Another flap-mouth'd mourner, black and grim,
> Against the welkin volleys out his voice;
> Another and another answers him.
> Clapping their proud tails to the ground below,
> Shaking their scratch'd ears, bleeding as they go.

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Compare with this the talk of Theseus and Hippolyta about hunting ("Midsummer Night's Dream," act iv. scene 1).

The "Lucrece," like "Venus and Adonis," was dedicated to the Earl of Southampton; and here the testimony of this powerful patron of Shakespeare's may be quoted as decisive against the fancy of the Baconian paradoxists, though it would be of no weight with the paradoxists themselves. The man to whom Shakespeare dedicated these poems, who knew at once of Shakespeare's powers and of his life, who must have suspected (if he had not known all about) the imagined compact between Bacon and Shakespeare, by which the ignorant paradoxist strives to blast the fame of both, had so contemptible a compact ever existed, wrote in 1608 to another nobleman, Lord Ellesmere, the Lord Chancellor, that William Shakespeare, his "special friend," "till of late an actor of good account in the company" (he was writing about the Blackfriars Theatre), "now a sharer in the same, and writer of some of our best English plays, which, as your lordship knoweth, were most singularly liked of Queen Elizabeth, when the company was called upon to perform before Her Majesty at court at Christmas and Shrovetide. His most gracious Majesty King James also, since his coming to the crown, has extended his royal favour to the company in divers ways and at divers times." To those who know in what respect nobility was held, and held itself, in the beginning of the seventeenth century, and the almost divine light which surrounded royalty in men's imaginations (Shakespeare presents his worst king as claiming that "divinity doth hedge a king"), the Earl of Southampton's testimony will appear most striking. The very fact that to us the honour is all the other way makes his expressions the more remarkable—free as they are even from the common fault of titled patronage, the offence of condescension. We may be well assured that the man whom, though but a plebeian, he esteemed his friend was known to him as the true author of the works he attributed to him. "Right famous is he," Southampton said of Shakespeare, "in his qualities." Yet the Baconian paradoxist must still believe that Shakespeare was an illiterate, uncultured countryman, ready to be the apt tool of Bacon's scheme—even though the paradoxist cannot tell us what imaginable reason Bacon had for entering on so contemptible a plot, or why, desiring to associate a likely name with his masterly plays, he should have selected a man of whom they say that it is utterly impossible (the extremest form of unlikelihood) that he should have produced even the weakest of them.

The "Lucrece," more than the "Venus," shows touches indicating study of Spenser, especially in the freer use of alliteration. Thus, in verse 8—

> When virtue bragg'd, beauty would blush for shame;
> When beauty boasted blushes, in despite
> Virtue would stain that o'er with silver white.

That Shakespeare could not have admired Spenser's more exaggerated use of alliteration, as in the fearful line, "The sad soothsayer seeing so sad sight" (though he has in "Lucrece" "To see sad sights moves more than hear them told"), we may guess from his jesting use of it in "Henry VIII." in the lines—

> Born by butcher, but by bishop bred,
> How high his haughty highness holds his head.

(The last must have taxed the aspirations of the Londoners if they were as bad in his time as now), and again in the prologue to the "very tragical mirth" of the play presented by Bottom, Quince, Flute, Snout, and Starveling—

> Whereat with blade, with bloody, blameful blade,
> He bravely broached his boiling, bloody breast.

In "Lucrece" the dramatic power of the poet shows itself as well as the descriptive. The soliloquies of Tarquin (there are four), in the longer of which he is Shakespeareanly presented, not as a weaker poet would have shown him, striving to justify the evil he proposes, but urging all reasons which should move him to desist, his words to Lucrece, her appeals to him and his final answer (which closely resembles the threat of Proteus to Sylvia in the "Two Gentlemen of Verona"), all these, though the poet has expanded them more than in a play would have been just, are strictly dramatic in character; and they are such passages as only the creator of Othello and Cymbeline could have produced. Passing over several dramatic passages, we find still more strikingly Shakespearean in dramatic power the closing scene where Lucrece tells her husband and father of the wrong done her. Only a Lucrece pictured by a Shakespeare could speak and plead as Lucrece here. The silence of Collatinus is in itself Shakespearean—

> Which speechless woe of his poor she attendeth,
> And his untimely frenzy thus awaketh:
> Dear lord, thy sorrow to my sorrow lendeth
> Another power; no flood by raining slaketh.
> My woe too sensible thy passion maketh,
> More feeling* painful; let it then suffice
> To drown one woe, one pair of weeping eyes.
> And for my sake—when I might charm thee so—
> For she that was thy Lucrece—now attend me.

(These two last lines are singularly beautiful, and very fine is the sudden change of tone in what follows):—

> Be suddenly revenged on my foe,
> Thine, mine, his own. Suppose thou dost defend me
> From what is past: the help that thou shalt lend me
> Comes all too late, yet let the traitor die;
> For sparing justice feeds iniquity.

Her appeal to the lords standing round to give their promise that the wretch as yet unnamed shall die, her anxious question whether she may acquit herself of blame, is followed at once (when—

> they all at once began to say
> Her body's stain her mind untainted clears)

by Tarquin's name, and the death-stroke, with the dying words (like Æneas' famed *Pallas te hoc vulnere, Pallas immolat*): "He, he, fair lords, 'tis he, that guides this hand to give this wound to me." All this is such as only the Shakespeare of the plays could have produced.

I find I have left no room to touch upon the sonnets as manifesting authorship by the same hand which wrought the plays. I leave them then to another occasion, only noting here further the use in "Lucrece," as in "Venus and Adonis," of words and phrases such as Shakespeare uses in his dramatic works. The "bloody, blameful blade" used jestingly in the "Midsummer Night's Dream" may be compared with the "cursed crimeful night" of Lucrece—even the quaint turn of expression being matched in—

> She sheathed in her harmless breast
> A harmful knife, that thence her soul unsheath'd.

Such strange words as "sneap'd," "rigol," "key-cold," and such expressions as "a barebon'd death," a "comfortable star" (like the "comfortable hour" of Richard III.), attest the common authorship of the plays and poems. But it is in such passages as the description of Lucrece sleeping, and her impassioned outcry against Opportunity, that the oneness of the Shakespeare of the plays and the Shakespeare of the poems is most clearly seen. The former should be compared with Iachimo's description of Imogen as he creeps from his trunk and robs her of the bracelet which is to be

* "Feeling" is here used adverbially for feelingly.

the false token of dishonour, and the latter with Falconbridge's abuse of Commodity.

In particular the latter comparison should be carefully made by all who feel tempted to cut the Gordian knot of the Shakespeare marvel by supposing that it was another than Shakespeare who wrote the plays. "Thou ceaseless lackey to eternity, thou foul abettor, thou notorious bawd, thou ravisher, thou traitor, thou false thief," says Lucrece, in her anguish; but at the last she sorrowfully says, "In vain I rail at opportunity." In like manner, Falconbridge, in his bitter disgust at the mad composition made by the kings, speaks of "This Commodity, the bias of the world, that daily break-vow, that bawd, that broker, that all-changing word"—then at the last asks, angrily, "Why rail I on this Commodity?" If two men wrote these tirades, then we may well believe that the "Inferno" and the "Paradise" came from diverse hands.

SCIENCE AND RELIGION.

IN the June, 1886, number of KNOWLEDGE appeared an article called "Science and Politics," in which we touched on the absurd idea that men of science, as such, are less qualified to form just opinions on political questions than farmers, tradesmen, manufacturers, brewers, or bankers, whether in their simple condition as such or after the process of election to our great parleying house. We pointed out that while the man of science is altogether out of his element, and indeed is acting altogether out of character, when he expresses opinions about political questions which he has not studied, he is not more out of his element in so doing than the farmer, banker, or merchant who does likewise, even though the farmer, banker, or merchant may have intensified such original ignorance of political matters by many years' practice in parliamentary procedure. And we showed further that the training of the student of science of these times, while it tends, on the one hand, to make him carefully avoid any expression of opinions about matters which he has not studied (caution which the average merchant, farmer, brewer, or banker does not invariably display), tends also, on the other hand, to make him examine carefully, and even anxiously, into the hidden causes of things, where persons not so trained are content to note sequence only, inferring causation unhesitatingly where there may not be even any connection whatever. The real difference between students of science and others in this matter, and that which has led to the mistaken idea that they think less about political and social problems than others, lies in the circumstance that they less frequently express opinions on such matters. The rest of the community, without thinking more—nay, probably thinking less—are seldom troubled by any doubts as to the justice of their views, and so speak openly and freely. People are accustomed to hear them thus speak at public gatherings, while the more thoughtful, or those who are more fully conscious of the difficulties of the problems dealt with, remain silent. But this should not lead to the conclusion that the loudest-voiced are the wisest or the best informed, or therefore the fittest to express an opinion (even though such opinion may be merely negative). On the contrary, it has been a misfortune to our own country, and is recognised as a still deeper trouble among our kinsfolk in America, that the people who undertake most confidently to deal with political matters, and who are least cautious in considering doubts and difficulties, are those least fitted for the task of guiding or controlling political events. Insomuch that while in England the term "politician" has become one of doubtful respectability, in America it is not a doubtful term at all, but expresses an unpleasant cross between charlatan and rogue.

A similar mistake affects the ideas most men form as to the fitness of the student of science to express opinions about religion. The mistake may, indeed, be not quite so obvious. For it depends on a notion very commonly entertained, and encouraged by the class to which it relates, that there is a certain set of men expressly trained for religious study, and especially fit, because of certain imagined qualities, to form just opinions on religious matters.

Let us at the outset note that we are not here considering what has been called—absurdly enough—the conflict between religion and science. There is no such conflict, and there never has been. "The real contest," as Fiske well remarks (in an essay on Draper's overvalued work on the imagined conflict), "is between one phase of science and another; between the more crude knowledge of yesterday and the less crude knowledge of to-day. The contest, indeed," as he proceeds to say, "is simply, as presented in history, the measure of the difficulty which men find in exchanging old views for new ones. All along, the practical question has been whether we should passively acquiesce in the crude generalisations of our ancestors or venture to revise them. But as for the religious sentiment, the perennial struggle in which it has been engaged has not been with scientific inquiry, but with the selfish propensities whose tendency is to make men lead the lives of brutes. Viewed in this light, religion is not only something that mankind is never likely to get rid of, but it is incomparably the most noble as well as the most useful attribute of humanity."

It is not, however, with this imagined conflict of science with religion, but with the fitness of the student of science to form and formulate opinions about religion, that we are here concerned. Nor are we opposing the truism sagely enunciated by George Eliot, among others, that the man of science is no worthier of a hearing than his fellows when he speaks of that which he has not specially studied. *Cela va sans dire.* The mistake to which we direct our argument is the commonly-adopted notion that men of science, as such, have not as good opportunities as other men, and are less disposed than most men, to examine and inquire into religious questions.

Men who are neither scientific nor clerical (to include in this word the priests and ministers of all orders in all religions) are for the most part content to take their religious ideas from the ministers of that particular religious body in which they happen to find themselves. To such men it naturally appears a mistake, and indeed an emphatic nuisance, for men not clerical in the wide sense just indicated, to form or express any opinions at all about religious matters. For, such expressions of opinion disturb their calm content in ideas about which they have never cared to think, or rather in the belief that there *are* religious ideas which other men have thought about, and which probably they themselves would accept as matters of opinion if they could spare time to think them out. Those who think they believe are as numerous as those who believe they think. The two classes, which include the great majority of men, overlap largely, though of course there are many who do not even believe they think, nay rather accept the doctrine that most men *ought* to believe (whatever doctrine lies nearest to them) without thinking at all. And this is perhaps as well, seeing that otherwise a somewhat dangerously large number of folk might be troubled with the thought that either the doctrine accepted by them (as lying nearest at hand) may be unsound, or else the other doctrines must be unsound which are accepted in like thoughtless

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way by the immense majority of their fellows. Besides the men who think and those who believe, besides those who think they believe and those who believe they think, the world must for the present have many who think they ought to believe, absurd though the idea of duty in connection with belief most assuredly is.

Under these curiously mixed and unsatisfactory conditions, the unthinking are content to believe that there is a set of men specially trained and specially fitted to examine the doctrines which happen to be those they themselves unthinkingly accept. So that if a student of science, accustomed to weigh and examine causes, and to speak with confidence only when (which is seldom) he has been satisfied with evidence, should express an opinion about matters seemingly touching such doctrines, the unthinking many console themselves by cheerfully concluding that he is out of his depth, resting content in the belief that only the members of that particular set of trained clerics can form just opinions about such matters.

In reality, however, the case is otherwise, with regard to nearly all the doctrines about which our Spencers, Huxleys, Fiskes, and others have spoken, or which the researches of science have appeared to touch. In the Roman Catholic Church, indeed, as among Buddhists, Mohammedans, and Jews, there are classes specially trained in theological study or even for dogmatic disputation. But the matters about which these trained men are alone competent to speak with authority are questions of ritual or doctrine lying within their own special church, and of little interest to outsiders. A Huxley or a Spencer may find himself at a loss, for example, in discussing with a Roman Catholic theologian such a question as the treatment of Galileo by Roman Catholic ecclesiastics—not because of any misapprehension of the subject really at issue, but from want of knowledge of the details of ecclesiastical procedure in such matters. But even within the strict limits of Catholicity, Buddhism, Mohammedanism, and Judaism, the really important problems of religion remain untouched in the systems of training adopted for ministers of various orders. Nay, those systems tend to narrow and limit the powers of the trained ministers, by directing their attention solely to points within a certain circle deemed sacred, and leaving them no scope for survey outside of it.

In the various nonconforming bodies which lie outside Catholicity, there is not any recognised system of training, of any value, which should fit men specially for religious discussion, and no training whatever which can enable them to deal with the higher and nobler problems of religion.

Take, for example, what is called the Established Church of England. This church, though singularly broad, yet has its definite limits of belief, within which a man may, if he will, call himself "a member of the Church of England as by law established," while outside those limits he must be regarded as a dissenter. Now, theoretically, the Articles of the Church define these limits, and every minister of the English Church should be thoroughly versed, not only in all that these Articles define, but in regard to the limits within which each Article must be understood. If all clergymen of the Established Church were so trained and taught, that would not mean much, nor would it in the slightest degree touch on the wider question we are considering. It would only imply that there was a certain set of men who could speak with authority as to the doctrines which a member of the Church of England may or may not accept: as to the wider questions relating to religion itself, regarded as "the most noble and most useful attribute of humanity," such training, even if it were systematically adopted, would be valueless.

But no such system even as this has been adopted. Though all our clerics are not trained at our universities, we have in these universities the chief and probably the best types of training for the ministry. What does such training amount to? The crowds which fill our churches probably imagine that the surpliced teachers to whom they listen have been specially selected from among those having a special calling to such work, and have then undergone special training—some such training as a lawyer, or a doctor, or a merchant, or an artist, or even a man of science, requires for successful work in the business of his life. But the actual case is very different.

As to calling:—It is well known that ninety-nine out of a hundred of the young men who go up to our universities (or to separate colleges) to be trained—save the mark!—for the ministry, have no calling that way at all. They form a section, taken as it were at haphazard, from our British youth. If there is any selection at all, it is such as arises from the thought in a father's mind that a son seems unlikely to succeed in law or medicine or business: or it may be that there is promise, through some family circumstances, of a good opening in the clerical way; or other such reasons operate. But this is not the kind of selection thought of when we speak of calling.

Then as to training:—Noting first that the material if equal is certainly not superior to the average, either in ability, or in what should be rather important in this special profession, in earnestness and strictness of character, the system applied to that material is not such as to fit it specially for the study of the higher and nobler problems of religious philosophy. Even in what may be called Anglican theology, most of the clerics sent out from our universities are ill trained. We do not say it is at all necessary that most of them should be well trained, seeing that their work in country places—the "holy vegetable" life, as Sydney Smith put it—requires no special training in the details of Anglican theology. But, for the argument we are here considering, viz., that clerics and clerics only should speak about religious matters, this particular shortcoming in the training of the average English clergyman must certainly be taken into account. Be it noticed that we are finding no fault with the system. Taking several hundred young men, most of them of only average brain power, and of perhaps less than average earnestness of purpose, but on the whole very fairly representing the intellect and character of their race, what can our ecclesiastical system do with them? Too high a standard would keep the majority of them out altogether, and then what would our country towns and villages do for clergymen? This would be disestablishment of the most unsatisfactory sort. Better to let them through with a little Latin and less Greek (not one out of ten can read the Epistle to the Romans in the Latin Vulgate, and not one out of a hundred can read that epistle understandingly in the Greek), a very small quantum of mathematics (the connection of which with religion is too obvious to need insisting on), and, finally, that very slight smattering of theological matter which the "voluntary" (so called because involuntary) requires to be "got up" in a week's reading—apparently so that it may be forgotten six weeks after ordination.

We would not be understood as speaking slightingly either of the average attainments or of the average character of the clergy of the Church of England. If our universities were chiefly used for the education of lawyers, doctors, or merchants, the results in all probability would be much the same. Among a hundred lads in a school, there will be one or two who are clever, nine or ten above the average, forty or fifty below it, and the rest duffers. There will be a few of fine character, many neither good nor bad, and a few of very poor character indeed—to put the matter

mildly. In a college it is the same; in fact, most of the young men in our colleges were lads in our schools a few years before. Thus there are a few capital classical scholars and first-rate mathematicians in our colleges, while there are numbers who are above the average in ability and education; but there are many times as many more who are below; and some are unutterably stupid. For the sake of these last, the Church ministry has to be made very easy of entrance; how easy only those know who have either gone through or have at least paid all such educational toll as the through passage requires. We who write learned much more theology in a year at King's College, London, at the ripe age of eighteen, than many of our fellow-Cantabs, now in the Church, learned during their University career. Many were unable, and not a few were unwilling, to learn more than just took them through, perhaps after much preliminary plucking. Yet not a particle of the small allowance of theological training necessary to admit bearer to the pulpit, scarcely a particle of the course of theological study which the better intellects pursued, had any bearing whatever on the wider or nobler problems of religion.

As to earnestness of character and purpose, English clerics present the same variety as English college youths, or as lads at English schools. But college life is not calculated to make men more earnest than they would have been without it. The future surpliced teacher in our country pulpits and parsonages is generally a good sort of fellow while at college. He probably plays a good game at cricket or tennis, or he rows well and staunchly, or he may be good both with the oar and the bat. He plays generally a fair hand at whist, and he usually likes good wine and good cheer. We like him none the worse for these innocent tastes and qualities: but they are *not* such as to assure us that he is exceptionally earnest in religious matters, or that he will be much better able than the student of science to solve perplexing problems of religion or philosophy.* For, be it remembered, the man of science usually *has* had a special calling, he possesses usually special ability, and he has usually had a special training for discussing questions whose relation to the higher philosophy of religion is somewhat nearer than the relation of whist or cricket, or even Greek and Latin syntax, to theological and doctrinal problems.

If the English Church, which being established may be supposed careful in such matters, has no class of trained teachers, though individual members of her priesthood may have studied her specific doctrines with special care, we may be sure that no body of Nonconformists is better provided with profound thinkers who are specially able, because of true calling, marked abilities, and long-continued study, to speak with authority, even about doctrinal matters. Individual preachers may in this sense be competent teachers, but the greater number cannot be. Assuredly whether they might be or could be, they *are* not, as their preaching shows. And even did each religious sect provide a class of teachers duly qualified and thoroughly trained, the wider and nobler questions of religion—which are not the dreary problems of theology, church history, or ritual, but far higher and far worthier of study—would not be brought within the scope of such teachers.

We should not care to define what qualities or what training would best fit a man for the discussion of the nobler problems of religion or philosophy. We believe that the best and purest, the most earnest and thoughtful, the man of keenest intellect and most fervent imagination, is not fit to penetrate within the temple wherein the Divine Mystery is enshrined. But among all men, though all men be unfit, none can nearer attain fitness to approach the temple than those who contemplate the Mysteries of Infinite Time and Infinite Space, of Infinite Might and Infinite Life, all ruled by Infinite and Eternal Law. They alone perceive what marvels of knowable truth lie within the infinite domain of the Unknowable.

* A friend of the writer's, whom we will call S., called a year or two after taking his degree on a college friend, whom we will call H., a parson in a dull but devout village. They were talking over the pleasant days of yore at dear old "John's," when two old ladies called to inquire how grace might best be obtained. "Don't go, S.," said H., who devoted for awhile his apparently most earnest attention to the old ladies' trouble. At last, *sat prata biberant*, the visitors departed, full of praise for the "excellent young man," whose carefully parted hair and mark-of-the-beast waistcoat had probably impressed them fully as much, had they but known it, as the well-worn platitudes he had addressed to them. With a sigh of relief, as he closed the door after them, the excellent young man, who really was a good fellow, though not over-earnest, turned to his friend, saying, "Thank goodness, those two old cats are gone! Come, S., my lad, let's have some beer." Our friend H. typifies a class—and, by the way, those two old ladies typify another. And both classes are very much larger than many imagine.

THE STORY OF CREATION.

A PLAIN ACCOUNT OF EVOLUTION.

By EDWARD CLODD.

PART II.

CHAPTER VI.—FACTS IN SUPPORT OF DERIVATION OF SPECIES.

THE evidence supplied by living things in support of their common descent is fivefold: viz., 1, in their beginnings and development; 2, in their structural likenesses; 3, in their typical divisions; 4, in their succession in time; 5, in their distribution in space.

I. *Embryology.*—The eggs or germs from which all living things spring are simple cells, made of the same sticky stuff called protoplasm, and are, to outward seeming, exactly alike. And this likeness persists through the earlier stages of all the higher animals, even after the form of the living thing is traceable in the embryo. In proof of this Darwin quotes the following from Von Baer, the discoverer of this remarkable fact:—

"In my possession are two little embryos in spirit, whose names I have omitted to attach, and at present I am quite unable to say to what class they belong. They may be lizards or small birds, or very young mammalia, so complete is the similarity in the mode of formation of the head and trunk in these animals. The extremities, however, are still absent in these embryos. But even if they had existed in the earliest stage of their development we should learn nothing, for the feet of lizards and mammals, the wings and feet of birds, no less than the hands and feet of man, all arise from the same fundamental form."* In further evidence of this inter-relation of living things, their embryos epitomise, as it were, during development, the series of changes through which the ancestral forms passed in their ascent from the simple to the complex; the higher structures passing through the same stages as the lower structures up to the point when they are marked off from them, yet never becoming the form which they represent for the time being. For example, the embryo of man has at the outset gill-like slits on each side of the neck like a fish; these give place to a membrane like that which supersedes gills in the development of

* "Origin of Species," p. 388.

birds and reptiles; the heart is at first a simple pulsating chamber like that of worms; the back-bone is prolonged into a movable tail; the great toe is extended, or opposable, like our thumbs and like the toes of apes; the body three months before birth is covered all over with hair, except on the palms and soles, like the soles of four-footed animals. At birth the head is relatively larger and the arms relatively longer than in the adult; the nose is bridgeless; both features, with others which need not be detailed, being distinctly ape-like. Thus does the egg from which man springs, a structure only $\frac{1}{125}$th of an inch in size, set before us the history of his development from fish-like and reptilian forms, compressing into a few weeks the results of millions of years. That which is individual or peculiar to his race, the physical and mental character inherited, is left to the slower development which follows birth.

The gills in his embryo, as also in that of other mammals, are one among many structures, more or less rudimentary, which witness to the unity of origin of every living thing. Certain organs appear in the fœtus which are useless to the adult, as teeth in whales, remnants of hind limbs in certain snakes, wings under the wing cases of insects that do not fly, rudiments of pointed ears in man, abortive stamens in plants, as the snapdragon, and so forth. Except as evidence of the modification of life-forms in which they occur from other life-forms, and of persistency of type, they are meaningless; the functions they once discharged have long ceased, being exercised only in other and allied living things where they are found fully developed.

II. *Morphology.*—Large groups of species, whose habits are widely different, present certain fundamental likenesses of structure. The arms of men and apes, the fore-legs of quadrupeds, the paddles of whales, the wings of birds, the breast-fins of fishes, are constructed on the same pattern, but altered to their several functions. Nearly all mammals, from the long-necked giraffe to the short-necked whale, have seven neck-bones; all insects and crustacea—moth and lobster, beetle and cray-fish—are alike composed of twenty segments; the sepals, petals, stamens, and pistils of a flower are all modified leaves arranged in a spire. Such facts need no comment.

III. *Classification.*—It has been already shown that all animals may be reduced to three types: the first, or lowest and simplest, without body cavity; the second, or intermediate, with body cavity; the third, ranging from the earth-worm to man, with digestive cavity separate from body cavity. The general likenesses of structure upon which a classification of living things is based have been detailed in the chapters on existing life forms,* and here the reminder suffices that the old attempts at a linear arrangement have failed, and that the only true mode of presentment, both of the life that is and that was, is that of a tree with short trunk, indicating common origin of the living from the non-living, and divided into two large trunks representing plants and animals respectively. From each of these start large branches representing classes, the larger branches giving off smaller branches representing families, and so on with smaller and smaller branches representing orders and genera, until we come to leaves as representing species, the height of the branch from which they are hanging indicating their place in the growth of the great life-tree.

IV. *Succession.*—All extinct forms have their time-range, all living forms have their space-range, and, if the theory of descent has any truth in it, their ancestors must be sought in the past. Broken as is the record, the great mass of it beyond reach, and the little that is within reach only thoroughly examined here and there, the accord of the facts of geological distribution with the facts summarised above is nevertheless complete. Each formation has its peculiar groups of fossil remains representing the life-forms of the period; the older the rock, the simpler are its organic remains, and, what is of no mean importance, although transitional forms are from their nature fewer and less permanent than forms which have arrived at balance with their surroundings, the fossil-yielding rocks have disclosed the existence of several hitherto missing links between species. Reference to some of these has been made in the summary of past life-forms, *e.g.*, to the proofs of descent of the one-toed horse of to-day, with his knee corresponding to our wrist or ankle, from the five-toed primitive horse found in the Eocene beds of North America, and to the connecting link between birds and reptiles supplied by the Archæopteryx. To this may be added the Compsognathus, with its swan-like neck, its toothed jaws, and hind limbs, on which it walked. Then there are the links between pigs and ruminants in the Anoplotherium; between tapirs, horses, and rhinoceroses in the Palæotherium; and in the Devonian strata forms occur which are considered intermediate between ganoids and mud fishes. Thus one by one the blanks are being filled up; the faith of the biologist is justified by his works.

V. *Distribution.*—Every living thing has its definite area of range: the sloth is peculiar to America, the hippopotamus to Africa, the chamois to the Alps; Arctic plants wither under the equator; those of the tropics perish in cold or even temperate zones, while a vast number flourish only in the original birthplace of all life—water. Among animals a few, notably man and the cat genus, have spread themselves well nigh everywhere; but, as a rule, certain species are restricted to certain regions, and hence the biological division of the land into regions corresponding to that distribution, and of the water into life regions measured by the limits of depth at which marine forms are found. Speaking broadly, the plants and animals of countries in unbroken connection resemble one another, while those of countries remote or cut off are unlike. But these general principles bristle with exceptions. In countries where the climate and general conditions correspond, as the equatorial regions of both the Old and New World, as also on the same continents, there are marked differences in the life-forms, probably owing to impassable barriers of mountain ranges, deserts, or oceans, while in countries with different climates, as in tropical Florida and frozen Canada, allied types are sometimes found. Puzzling and capricious as the distribution of life may seem—*e.g.*, tapirs are found only in South America and Malacca, with its neighbouring islands, being thus separated by nearly half the globe's circumference—in this, as in aught else in nature, nothing is accidental. Distribution is due to the migration and transport of living things, which, under the agency of natural selection, become more or less adapted to new conditions, and much light comes therefrom, not only on the theory of the origin of species, but also upon past changes in the relations of land and water. Where allied forms which are unable to cross the seas are found in lands now separated, as in Britain and Japan, in Southern Europe and North Africa, we have evidence of former union; the degree in which species have been modified giving some key to the remoteness of that union.

In the study of the very complex problem of distribution, islands afford important aid. They are of two kinds, continental and oceanic. The continental have been broken off from the mainland, as the British Isles, Japan, the far more ancient Madagascar with its lemurs, and New Zealand with its wingless birds and remarkable one-eyed lizard. The oceanic, as the Azores and Sandwich Islands, are of

* *Vide* KNOWLEDGE, June to October, 1886.

volcanic or coralline formation, and depend for their life-forms upon their relative position to the mainland, and also to the winds and ocean-currents that prevail. Exclusive of animals introduced by man, they are found destitute of frogs and other batrachians; also of mammals, bats excepted; the explanation being that sea water kills frogs and toads and their spawn, and that only flying animals can cross the ocean. For this reason bats, at least the insect-eating species, are found everywhere, except at the Poles; and the range of birds, although defined, is much wider than that of all the larger and wingless land-animals.

Isolated islands like St. Helena are peopled with waifs and strays from all quarters, while in continental islands like our own the life-forms are, for the most part, identical with those of the nearest mainland. But here, again, exceptions exist. The islands of Bali and Lombok in the Malay Archipelago, although only fifteen miles apart, differ far more from each other in their birds and quadrupeds than do England and Japan, the birds being extremely *unlike*.* As shown by the deep soundings, Bali belongs to the Indian region, and Lombok to that zone of "living fossils," the Australian region. Australia contains only the lowest mammals, as duckbills and kangaroos—for there is little doubt that the dingo was introduced by man—witnessing to its severance from Asia millions of years ago during the Secondary epoch. It is an ancient and little altered fragment, preserving the types of plants and animals which were then dominant on the great shifting land areas, and from which the higher forms have been developed.

Oceanic islands, with their population of birds, flying insects, and a few creeping things, are the refuge spots of castaways. Strange are the ways and means of dispersal. Winds waft and currents drift to distant shores icebergs laden with earth and seeds, or masses of floating vegetation, sometimes so matted with soil as to form island-rafts with trees upstanding, and carrying with them not only numbers of grubs, and eggs of insects, but even large animals. Birds are important agents in plant distribution, transporting seeds embedded in dirt sticking to their feet or beaks, or the barbed seeds of certain plants, like the curious *Uncinia*, which cling to their feathers, or the undigested seeds and stones of fruits which are passed through their bodies. A swift-winged bird may drop cherry-stones a thousand miles from the tree they grow on; a hawk, in tearing a pigeon, may scatter from its crop the still fresh rice it had swallowed at a distance of ten degrees of latitude. Among the many suggestive experiments which Darwin made in this matter, he cites the case of the leg of a wounded partridge to which a ball of hard earth weighing six and a half ounces adhered. The earth had been kept for three years, but when broken, watered, and placed under a bell-glass, no less than eighty-two separate plants of about five distinct species sprang from it.

Very important, also, although more remote in its ultimate results, is the agency of man, especially of civilised races, in the distribution of life. Both with and without intent he distributes and destroys, as his needs or caprices demand. Clearing forest, draining lake and bog, reclaiming land from sea, or uniting ocean with ocean, he disturbs, or mingles, or kills their life-forms. He imports strange plants and noxious insects in his merchandise; he transports the healing cinchona plant from Peru to India, the salmon ova from our native streams to the rivers of Australia, and to him is due the re-introduction of the horse into America, which had been extinct there long before the arrival of Columbus. "The *hortus siccus* of a botanist may accidentally sow seed from the foot of the Himalayas on the plains that skirt the Alps; and it is a fact of very familiar observation that exotics, transplanted to foreign climates suited to their growth, often escape from the flower-garden and naturalise themselves among the spontaneous vegetation of the pastures. When the cases containing the artistic treasures of Thorwaldsen were opened in the court of the museum at Copenhagen where they are deposited, the straw and grass employed in packing them were scattered upon the ground, and the next season there sprang up from the seeds no less than twenty-five species of plants belonging to the Roman Campagna, some of which were preserved and cultivated as a new tribute to the memory of the great Scandinavian sculptor, and at least four are said to have spontaneously naturalised themselves about Copenhagen."*

While needless destruction has too often followed in the wake of man, as he humours the cruel freaks of fashion, or kills out of sheer wantonness, his enterprise has, on the other hand, ridden the soil of harmful weeds and baneful animals; developed food from wild or useless plants; luscious fruits from sour and dwarfed species; and domestic animals, the dog probably earliest of all, from the fierce beasts of the forest and the plain.

Enough has been said to show that no pre-ordained scheme of fitness for their several habitats has placed plants and animals where they are found. So far as most of the higher life-forms are concerned, our best authorities, with Mr. Wallace at their head, incline to the theory of their first appearance in the Euro-Asiatic continent, the wave of migration rolling over the Old World far south by routes long submerged, and by a northerly land route into the New World. And, since few birds and insects are capable of crossing the great oceans, it seems likely that they took the same course, in confirmation of which we find that those birds which migrate between Europe and Africa travel by way of Greece, Malta, and Gibraltar, the three points at which those continents were once united.

* Wallace's "Island Life," p. 4.

THE OIL STORES OF AMERICA.

AMONG the most pleasant and interesting features of lecture travelling must be set the opportunities offered for studying various characteristic regions of the earth. During my own lecture travels in England, Scotland, Ireland, and Wales, in nearly every State and Territory of America, in Canada, Australia, Tasmania, New Zealand, and so forth, I have had many opportunities of this kind. For in most regions where anything of special interest is to be seen, I have found many ready, nay eager, to show and explain what is chiefly to be noted.

I propose now to make some remarks about the oil regions and the oil industry of Western Pennsylvania and South-western New York, a subject to which my attention has naturally been turned during that part of a short lecture tour I am taking which brought me to Fredonia, N.Y., Meadville, Pa., &c. Of course, I only propose to consider the subject in its scientific aspect, though I may have to remark on the singularly wasteful way in which nature's earth stores have in this case been drained, till what took many millions of years to accumulate has been probably more than three-fourths consumed in fewer than thirty years.

The first question naturally asked in regard to these oil supplies is, How came they there? Of course, to answer

* Marsh's "Man and Nature," p. 67.

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this question fully and in detail would be a very difficult task, and is at present certainly impossible. But, speaking generally, it may be said that the choice lies between two theories, in greater or less vogue among geologists; while, so strongly does all the evidence bear on the side of one of these, that it is very difficult to understand how any doubt can remain as to its essential validity.

Let it be premised that the oil occurs chiefly in what are called pools, though they are not in the slightest degree like pools—certain sands found at a greater or less depth beneath the surface, and permeated with oil in such degree that in some cases a cubic foot of oil is obtained from every ten or twelve cubic feet of sand. Intermixed with the oil is a gas which also is found collected in many places above the oil pools, in a highly compressed state. This gas is variously constituted in different wells. It always contains a large proportion of marsh gas—the gas which rises from the ground above places where animal or vegetable matter is undergoing processes of decomposition. It also contains hydrogen, carbonic acid gas (or what chemists now call carbon dioxide), ethyl hydride, and several hydrocarbons. The petroleum itself has been formed from the condensation of a portion of this compound gas. The proportions of the several gases vary in different wells. Thus, while marsh gas amounts in some wells to nearly 90 per cent. (89·65 is the highest amount yet deduced from analysis, I believe), gas from the Cherry-Tree well shows only 60·27 per cent. of marsh gas. Hydrogen ranges from 6·6 to 13·5 per cent. in other wells, but in gas from Cherry-Tree well amounts to 22·5 per cent. In like manner carbonic acid gas, which has a range of from $\frac{35}{100}$th to $\frac{66}{100}$th per cent. in gas from other wells, runs up in the Cherry-Tree gas to 2·28. Again, while there is no trace either of oxygen or nitrogen in the gas from most of the oil districts, we find in the gas from the Cherry-Tree well $\frac{83}{100}$th per cent. of oxygen and 7·32 per cent. of nitrogen. Of ethyl hydride, which may be regarded as the chief component of all the petroleum gases outside the marsh gas and the permanent gases, we find the percentage ranging between 4·39 and 18·39 in other wells, and amounting to 6·80 in the Cherry-Tree gas. I have been somewhat particular in noticing the exceptional nature of the gas from the Cherry-Tree well, because it illustrates strikingly the effect which local peculiarities may have in modifying the chemical constitution of the gas found in the oil districts. The Cherry-Tree gas reaches the surface through water; we can understand well, then, that it should contain a relatively larger proportion of hydrogen, oxygen, nitrogen, and carbonic acid gas (with which the water is largely charged).

It is worthy of notice, however, that the structure of the sands in which the oil is chiefly found by no means affects in similar degree, or even in any appreciable degree at all, the character and chemical constitution of the oil. This is the first, and perhaps most striking, piece of evidence showing that the oil was not originally formed where it is now found. For convenience I present the evidence on this point, in company with other evidence about the oil regions which is full of interest, though not bearing directly on the question of the origin of petroleum.

The sand from which the oil in the Allegany (not Allegheny) and Bradford districts is obtained consists of a grey-black, dark-brown, or chocolate-brown coloured sand, singularly uniform in texture, of about the coarseness of the ordinary black sand of the New Jersey coast. The oil obtained is dark amber-green in colour, and occasionally black. The specific gravity is about half that of water, that is about 50. The Bradford oil region has an extent of about 133 square miles, and up to January 1, 1885, had produced 820,000 barrels per square mile, or 109,000,000 barrels in all. The Allegany region has an area of 31 square miles, and to the same date had produced 15,000,000 barrels of oil, or 419,000 per square mile. Now the sand of the celebrated Venango district consists of white, grey, and yellow pebble rock—the pebbles being obviously water worn, and as large as hazel-nuts, loosely cemented and bedded in fine sand, which is by no means so regular as that of the Allegany and Bradford regions. Hence there are dry tracts (holes they are called, being no more holes than the rich tracts of oil sands are pools) where the oil has not gathered. The oil in the Venango district is generally green, but frequently black, and sometimes amber. Its specific gravity ranges from 30 to 51, but may be regarded as averaging about 48. This district has an area of 65 square miles. The total produce to the beginning of 1885 amounted to 55,000,000 barrels, or 846,000 barrels to the square mile. The Butler district has an area of eighty-four square miles. The sands resemble those in the Venango region, and the oils obtained are similar in colour and specific gravity. To January 1, 1885, the supply of oil from this region amounted to 69,000,000 barrels, or to 821,000 barrels per square mile. From the Beaver district, sixteen square miles in extent, 1,000,000 barrels had been obtained by the beginning of 1885, corresponding to 62,000 barrels per square mile. In this region the sand rocks correspond with those called the Pottsville conglomerate and the Berea grit in the sub-carboniferous series. The oils obtained from the Butler district are mostly amber-coloured. In the Warren region, thirty-five square miles in extent, the sands vary greatly in character. The total produce to January 1885 was 12,000,000, or 343,000 barrels per square mile.

When we notice in the Venango drillings coarse sand and pebble, and pieces of pulverised rock showing no traces of petroleum, we cannot but feel how unlikely it is that such a rock could ever have contained enough organic matter to yield a cubic foot of oil to every ten or twelve cubic feet of rock. Again, it is obvious that in such a rock substance organic matter would decompose and waste. The organic matter could not have found its way into those pebbly sands while they were exposed to atmospheric influences, for in that case the oil would have been volatilised and dissipated. Nor could it have been accumulated when these sands were in contact with the water; for then the oil, being of much lighter specific gravity, would have risen to the surface and floated away as fast as it was formed. The oil must, then, have been introduced into these sands long after they formed part of any shores, or were near to the surface of the earth's crust, whether that surface above these sands were under water or not.

But perhaps the strongest argument against the theory that the oil was formed *in situ* resides in the very special way in which the oil is distributed in layers at different depths, but under the same place. Of course, if each sandy tract originally supplied its own organic material, animal and vegetable, from whence, long after, oil was formed (the region sinking to depths where the heat and temperature were sufficient to decompose the organic material and generate from it vast quantities of gas), we could not expect any connection to be shown between the distribution of the oil in one sand pool and the distribution in another lying below it (at so great a depth as to indicate very long time-intervals between the formation of the respective sands). But a singular connection is actually recognised, the meaning of which seems unmistakable. Wherever a tract of oil sand overlies a lower rich oil sand the upper sand is always poor. But if portions of a lower oil sand are rich and other portions poor, then the upper oil sand is rich where the lower is poor, and poor where the lower is rich. Again, where an upper sand tract extends farther than a lower one, the part overlying the

lower will be poor, while the part extending beyond the lower will alone be rich. Still more marked and significant are the peculiarities recognised when there are three sand tracts at different depths, for in such cases, while the second is found to be richest where it extends beyond the lowest, and the uppermost richer where it extends beyond the second, the uppermost is richest of all where it extends beyond both the next lower and the lowermost of all. This corresponds exactly with what might be expected if the gas rising from organic matter, decomposing under the influence of high temperature, were absorbed by the overlying sand tracts, wherever the conditions were suitable, the absorption in any given sand tract, of course, diminishing the amount which could give rise to a sand tract above. The significance of this peculiarity can hardly then be misunderstood; we may safely conclude that it has been by this process of distillation, and not *in situ*, that the oils have been formed in the great oil-sand regions of Pennsylvania and New York.

It would seem as though the oil had been formed from the condensation of gas rising from the carbonaceous shale lying at greater or less depths below the sands where the oil is found. Such carbonaceous gas would be generated in immense quantities from materials brought into the region of the Appalachian range from various sources and at various times. Large quantities of organic matter were stored in the limestones and shales of the enormously thick beds of the silurian formation, augmented afterwards by the contents of rich carbonaceous deposits during the Lower Devonian age. From these masses of organic matter, submitted at times to high temperatures, and always at immense pressures, deep as they lay below the region of the oil-collecting sands, immense quantities of carbonaceous gas would rise, to be condensed in some regions into oils, but elsewhere to remain as gas at very high pressure, and ready to burst forth with amazing energy whenever an outlet should be found or forced for it. [It is to be observed that for the formation of the oil pools the carbonaceous shales and the sandstone rocks are both in equal degree necessary, the former to produce the oil-gas, the latter to retain it on its way towards the surface, where, unless thus captured, it would escape.]

It can hardly be doubted, I fear, that the supply both of oil and gas has now been so largely drawn upon that within less than a score of years scarcely any will be left which can be brought at reasonable cost into the market. The boundaries and extent of the oil regions have been determined. All the sands in which oil will ever be found in such quantities as to be worth working are known, and have been drilled through in various places. It is scarcely possible that any new fields will be discovered which will be comparable either in extent or productiveness with those now known. So far back as January 1883, Professor Lesley pointed out that no petroleum is now being produced in the Devonian rocks, either by the process akin to distillation, described above, or otherwise. What has been stored up in the past, a process which probably lasted for millions of years, may be got out. But when these reservoirs are exhausted there will be an end of the petroleum supply. "The discovery of a few more pools of two or three millions of barrels each can make little difference." Mr. Carll, whose opinion on the geology of the oil-bearing districts may be regarded as decisive, has come to a similar conclusion. "There are not at present," he pointed out quite recently, "any reasonable grounds for expecting the discovery of new fields which will add to the declining products of the old, so as to enable the output to keep pace with the shipments or consumption."

The stored petroleum in this region has then been very nearly exhausted. In less than a generation, a small part of the population of this continent alone has used up nearly all the valuable stores of energy which had been accumulated during millions of years of the geologic past.

More recent inquiries confirm the conclusions of Professor Lesley and Mr. Carll. The signs of exhaustion in the oil-producing regions can now be clearly recognised. During the last four years there has been a steady diminution in the output, accompanied by an increase in the price per barrel, which nevertheless does not even maintain the nominal annual value of the supply. Mr. Wrigley announced in 1882 that 154,000,000 barrels of oil had already been raised up to the beginning of that year, and expressed the opinion that not more than 96,000,000 barrels remained to be raised. In this last estimate he was undoubtedly mistaken, for up to the beginning of 1885 no fewer than 261,000,000 barrels had been raised, and in the year 1885 as many as 21,042,041 barrels (nearly 3,000,000 fewer than in 1884) were obtained. But although the estimate in 1882 of the quantity of oil still remaining fell far short of the truth, and though we may admit as possible that even now much more oil remains to be put out than the most experienced geologists suppose, the signs of approaching exhaustion are yearly becoming more unmistakable. The expense of bringing the oil to the surface grows greater year by year, and threatens soon to become so great that the profit of working the oil stores will be evanescent. So soon as that state of things is approached, we may be sure that the oilmen's occupation in Pennsylvania and Western New York will be gone. It has been stated that the Japanese, unwilling to let the least fraction of the earth's interior stores be lost, have been known to excavate a vertical shaft to a depth of 600 feet in order to raise a few gallons of oil per day. But in America when the oil mines are so near exhaustion as this, they will be abandoned; nay, they will be abandoned long before they approach such a condition. With the failure of the oil supply, all the collateral branches of industry associated with it will fail too.

CLOTHES-MOTHS AND THEIR ALLIES.

By E. A. Butler.

In a former paper we gave an account of one of the commonest of our clothes-moths, *Tinea pellionella*; it now remains to consider the other members of the same genus to which a similar epithet is applicable. And first as to *T. biselliella*. This is a little creature, something like *pellionella*, but usually rather larger and with shining ochreous fore-wings, which are perfectly devoid of spots; the hind-wings are paler, and the head reddish. Its caterpillar feeds upon various animal substances, such as hair, feathers, wool, &c., and so may occasionally be found in the linings of sofas and chairs, and in mattresses. It is an abundant insect, and its habits are similar to those of the before-mentioned species, but there is this difference, that the present insect does not, when a caterpillar, weave for itself a coat in which to go on its travels. At the commencement of its larval life it is said to feed without any covering by way of protection; but after a while it finds the necessity of preserving its delicate body from the attacks of its somewhat ill-tempered and aggressive companions, if from nothing else, and therefore constructs a kind of tubular tunnel in which to take shelter. This, however, is fixed to some support, and is thus a shed rather than a garment. It is in this run, too, that the change to the chrysalis takes place; but then the ends are closed up, and the dormant

insect is thus secured from molestation during the period of its seclusion.

Even at this stage of its life it is a lively little being, any disturbance of its retreat being resented by petulant wrigglings of its brown, mummy-like form. When the time for its final change arrives, it shifts itself along to the entrance of the cocoon by means of tiny hooks on its back, and then works its way out of its pupa case, which it leaves projecting from the end of the cocoon. The larvæ may be found in our houses from February to September inclusive, and the moths from April to November.

The next species is *T. tapetzella* (fig. 1). This is considerably larger than the two preceding, and very different

Fig. 1.—Tinea Tapetzella.

from them in colouration, though sufficiently similar in shape to show that it should be referred to the same genus. When the wings are fully spread, the moth has an expanse of $\frac{3}{4}$ inch, and it may very easily be recognised by the startling contrast in the distribution of its colours. The fore-wings are black over their basal third part, and then over the rest of their area creamy white, slightly mottled with darker, especially at the tip. The hind-wings are shining brownish-grey and have long fringes. When the wings are closed, they are laid close alongside the body, and then, of course, no trace of the hind pair is seen. We have simply a long narrow object with the front part black and the hinder white.

This insect, in its larval condition, delights in coarser food than its predecessors, and devours with avidity such fare as carpets, horse-cloths, &c. The thickness and more substantial character of this food affords the grubs protection also, and renders the construction of a separate case unnecessary—as they burrow into the cloth, it is thick enough to conceal them, and they, therefore, only care to line their burrows with silk. In these tunnels they can reside and feed quite secure from observation. This insect is sometimes called the "tapestry moth," from the fact of its depredations occurring chiefly in such materials; the linings of carriages, too, are sometimes destroyed by it. The caterpillar may be found in April and May, and the moth in June and July. From its habits one may easily gather that it is less frequently met with in the house than in outbuildings, such as stables, coach-houses, &c. The writer once found quite a family of them in a piece of carpet that was used as a bandage round a young sapling in a garden, to prevent the cord by which it was tied up from injuring the bark.

Lastly, there is *T. rusticella*. This is less strictly a clothes-moth than the others; it seems to be in no way particular as to the exact character of its diet, provided it be of an animal nature and sufficiently dry, and in consequence it has been found in the most unlikely places. For instance, Mr. C. G. Barrett one winter collected a number of old nests belonging to chaffinches and other birds of that sort, nests that are largely composed of wool and hair, and on keeping them till the summer he obtained from them large numbers of Tineæ, the larvæ of which had been feeding on the materials of which the nests were composed, and amongst these were some specimens of the above insect. Again, it was found by Mr. C. Eales in a more unsavoury locality still. He one day came across the dried-up corpse of a cat, and observing that it contained larvæ and pupæ of some moths, he kept it till the perfect insects appeared. Many of these turned out to be *T. rusticella*. In its natural state, therefore, this insect is clearly a devourer of animal refuse—in fact, one of nature's most useful scavengers; and if we introduce animal matters, though of far less objectionable character than these, into our houses, we need not be surprised that sometimes the scavenger follows them, intent upon the fulfilment of its natural function.

The caterpillar is, as usual, a whitish creature with a brown head. The moth, which is about the size of *T. biselliella*, is dark greyish-brown on its fore-wings, slightly tinged with purplish, and minutely speckled with yellowish dots; it has also a pale transparent spot on the disc of the wing before the middle, and another similar but smaller one at the outermost lower angle of the wing.

Various methods have been suggested for getting rid of these pests; this, however, is hardly the place for discussing the merits of rival insecticides. But there is one ingenious method which, if not very practicable, is yet so interesting that it must receive a passing notice. It is well known that silkworms are a prey to a certain disease called "muscardine," which arises from the growth of a parasitic fungus. The idea occurred to Balbiani that if the larvæ of clothes-moths could be inoculated with this disease, the result would be similar to what it was amongst the silkworms—their numbers would be speedily and rapidly diminished, and a benefit would thus be conferred upon mankind. He accordingly reduced the remains of some "muscardined" silkworms to a powder, and laid his trap by sprinkling this bait over clothes infested with the destructive larvæ. The grubs ate of the fatal meal, developed the disease, and miserably perished. The powder, however, was found to lose its efficacy to some extent if kept for any length of time.

These are all the insects that can fairly be called "clothes-moths"; but there are several other small moths that occur in our houses, and, being general feeders, are destructive in other ways, though they are generally credited with designs upon our woollen fabrics. Some of these belong to the same extensive genus as the clothes-moths proper—*e.g.*, *Tinea ferruginella* (very similar to *rusticella*, but smaller), *fuscipunctella* (also somewhat similar, but without the transparent spot), *misella* (yellowish brown, with paler markings and two dark dots), and *nigripunctella* (yellowish, with several blackish spots). Some of these occur not unfrequently, but others are rare.

But there are two insects which greatly exceed in numbers both these and most other household species, and are often more abundant and universally distributed than the clothes-moths themselves. They are *Endrosis fenestrella* and *Œcophora pseudo-spretella*, both representatives of a new and very extensive family of Tineæ, the *Gelechidæ*. A glance is sufficient to show this; for first, in rest, the wings lie flat along the back instead of by the sides, as in the *Tineidæ*; secondly, a hand-lens shows that the head, instead of being crowned with the erect, hairlike plumes of a Tineid, is covered, at any rate in front, with broad, flat-lying scales, which suggest the idea of their having been brushed over the forehead like the "fringe" of a modern English female; and thirdly, there is a pair of enormously large curved palpi, much longer than those of the *Tineidæ*, pointing upwards from beneath the head like a pair of miniature bull's horns.

The former of these insects (fig. 2) is literally ubiquitous. From appearing usually on windows, it has received the name *fenestrella*, or "window moth;" but it has also been called *lacteella*, or "milk moth," in consequence of being so frequently found drowned in the contents of milkjugs. The water-jugs and basins in our bedrooms also often testify to similar fatalities. It is really a very pretty little creature, and if only it were rare would be highly prized on account

of its beauty, but being so abundant, and a "moth" to boot, its fair exterior goes for nothing, and it is only considered a nuisance. It has brownish fore-wings, speckled with darker, but its head and thorax are of a pure snow white. This description is quite sufficient to enable it to be recognised, for there is no other little moth like it. It is a larger insect than most of the preceding, and the wings, when fully spread, stretch about two-thirds of an inch. Its white head, which is an exquisite object for a low power of the microscope, renders it easily seen, and in consequence it has often to pay the penalty of death for crimes it has never committed. The finger of the careful housekeeper often comes

FIG. 2.—ENDROSIS FENESTRELLA.

down upon it with vengeance, treating it as a devourer of woollen goods, when the real culprits—such insignificant creatures as *T. pellionella* and *biselliella*—by their smaller size and obscure appearance, escape notice. It is, in fact, not a clothes-eater; its larva feeds upon all sorts of waste substances, especially those of a vegetable nature, and thus, no doubt, often clears up for us a good deal of rubbish out of odd corners. It may be found all the year round, and probably there is scarcely a house anywhere of which it is not an inhabitant.

Though the presence of the window-moth in our houses may be condoned, the same cannot be said of its near ally, the detestable pest, *Œcophora pseudo-spretella*. This is one of the most destructive insects imaginable, and is apparently a perfectly general feeder; nothing that is in the smallest degree edible comes amiss to it. It is rather larger than *Endrosis fenestrella*, of a pale brown colour, more or less completely mottled over with dark brown, and with three very deep brown spots, two before the middle of the wing, placed one above the other, like a colon, and one beyond the middle. The distinctness of these spots depends upon the intensity of the ground colour of the wings, which varies a good deal. The hind-wings are paler without markings, and as usual have long fringes. When in good condition, which is not likely to be the case, except just after emergence from the pupa, the fore-wings are shiny. They are placed in a flat position over the back, and thus cause the insect to appear larger than a Tinea of the same size would. The moth is fond of concealment, and often hides amongst the substances that have suffered from its depredations. When disturbed, it runs rather than flies, and that very rapidly, at once seeking shelter again. To pursue it with one's fingers is no easy task; it is so rapid in its movements and so slippery when touched, in consequence of the glossiness of its scales, that the pursuit is apt to try both patience and temper of pursuer.

The caterpillar is a whitish creature with a brown head, of an active habit, but concealing itself most effectually by spinning together quantities of the material it happens to be feeding upon. It does not take the trouble to bite off neat pieces of this material and weave them carefully and deftly together, as the clothes-moths would do, but seizes hold of anything near, whatever its size, and attaches it, as it is, by one of its ends, so that the pile seems little more than an accidental heap. Under this it can feed at its ease. But a keen eye will soon detect traces of its presence, in the shape of pellets of excrement thrust out from the end of its tunnel. It is particularly fond of invading an entomologist's stores of insects, and if he be by any means careless enough to grant it a footing he will find immense damage done before he suspects anything, and also find that his little foes are very difficult of eradication. The ravages in such cases are really very cleverly concealed: *e.g.*, the unfortunate collector, noticing one of his larger moths, say, with its wings drooping apparently a little more than usual, essays to remove the specimen with a view to discovering the cause, when he finds that, as he pulls out the pin on which it is impaled, he removes no more than a mere shell of the body, and leaves the wings attached to the bottom of the box; *pseudo-spretella* has been at work, and has cleverly fastened down the wings of the moth, but in such a way as hardly to disturb their position, and then, using them as a roof, has proceeded to scoop out the contents of the body, being still careful to leave the skin entire, so that until the tug at the pin reveals to the chagrined entomologist the utter destruction of his specimen, it looks almost as perfect as ever.

From this habit of concealment, practised by both larvæ and perfect insects, it often happens that vast damage is done before the presence of the destroyer is suspected, and in any case the damage is sure to be great, so much more being spoilt by being woven into the roof of the shed than is really destroyed by being eaten. Mr. C. S. Gregson speaks of tons of rice in a warehouse having been destroyed by this insect. Each caterpillar had spun together six or eight rice-grains, and they thus made numbers of little bundles of rice, which they used both as shelters and as food. The same observer speaks of having been informed that some small caterpillars were doing great damage amongst the stores of sweeping-brooms belonging to one of the local government boards in Liverpool. On receiving specimens of the damaged articles, he found that they were ling besoms (brooms made of heather or ling), and that the destroyer was none other than *pseudo-spretella*, which, notwithstanding that all it had had to live upon was dry heather brooms, was nevertheless more fat and flourishing than usual.

The larva of this insect is a winter feeder, and may be found in the early months of the year, the moth appearing in July and August.

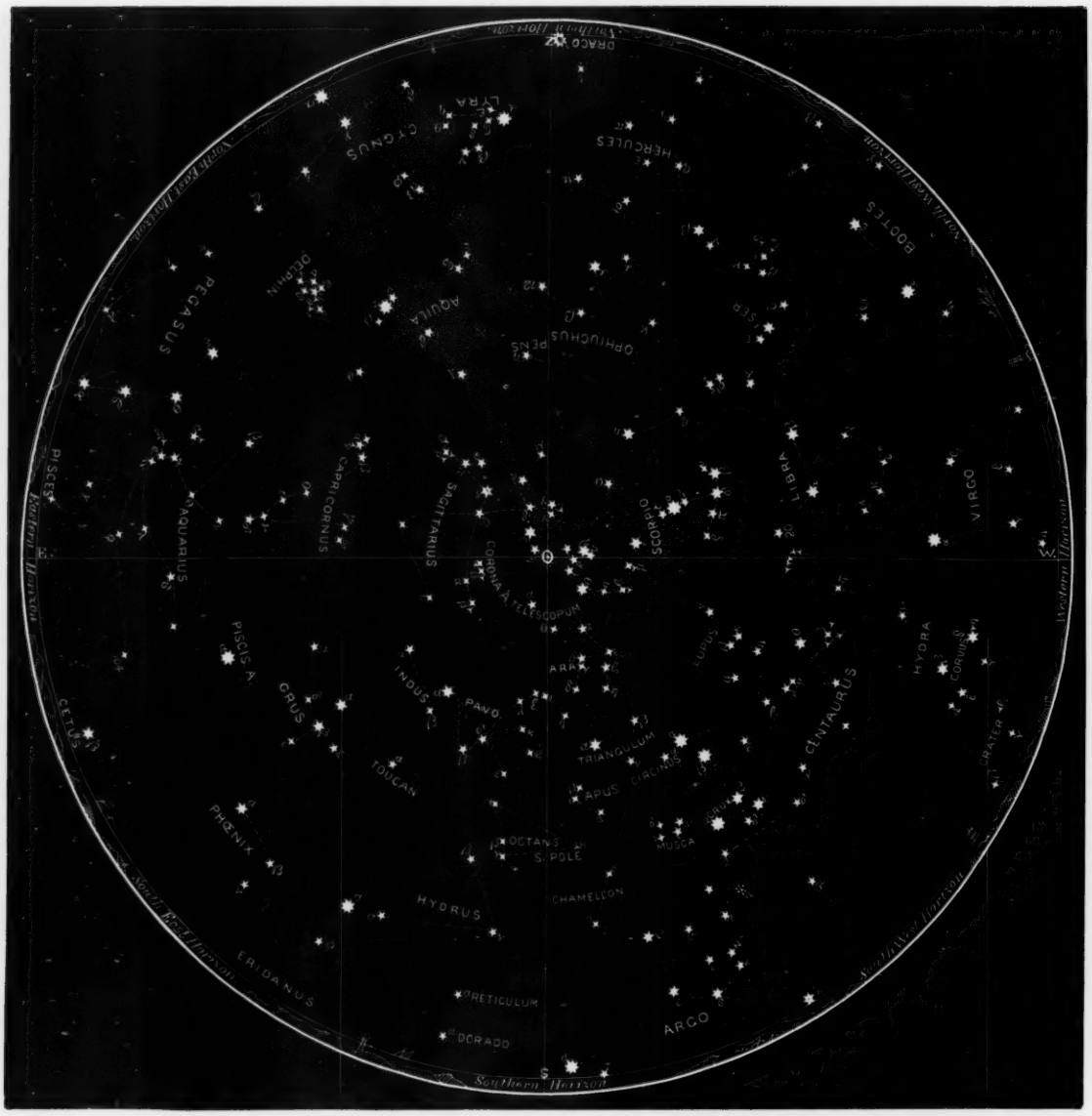
A very near relative of these two insects, called *Œcogenia Kindermanniella*, is sometimes found in houses, especially near London. It is smaller than either of its allies, and is a very pretty insect, having the narrow fore-wings dark purplish-brown, with three broad pale yellow patches.

AMERICAN ENGLISH.—A Boston man tells how few in England understand American-English. "I had not been in Liverpool an hour," he says, "when I became convinced that I had much to learn about the English language. When I entered my hotel I asked the young woman who received me, 'What are your terms?' and had I spoken Choctaw she could not have understood me less. 'What do you charge a day?' I next ventured. 'Charge?' she replied, vaguely, and I gave it up. Another woman was summoned, and I tried again. 'Ah! you want the tariff?' she said at last, and sure enough I did. Now, if I had used the word 'tariff' in that sense in Boston, it would have been considered slang. [It is clear the mistake lay not in the words used, but in the thing signified; the Boston man misunderstood our hotel ways.] I tried in vain to get a pair of suspenders, as they would show me none but those for stockings, but succeeded finally in buying some 'braces.' I might prolong the list *ad infinitum*, but enough is shown to warrant the publication of an American-English dictionary of synonyms for the use of travellers."

XUM

THE SOUTHERN SKIES.

MAP VIII.—FOR MAY, JUNE, AND JULY.

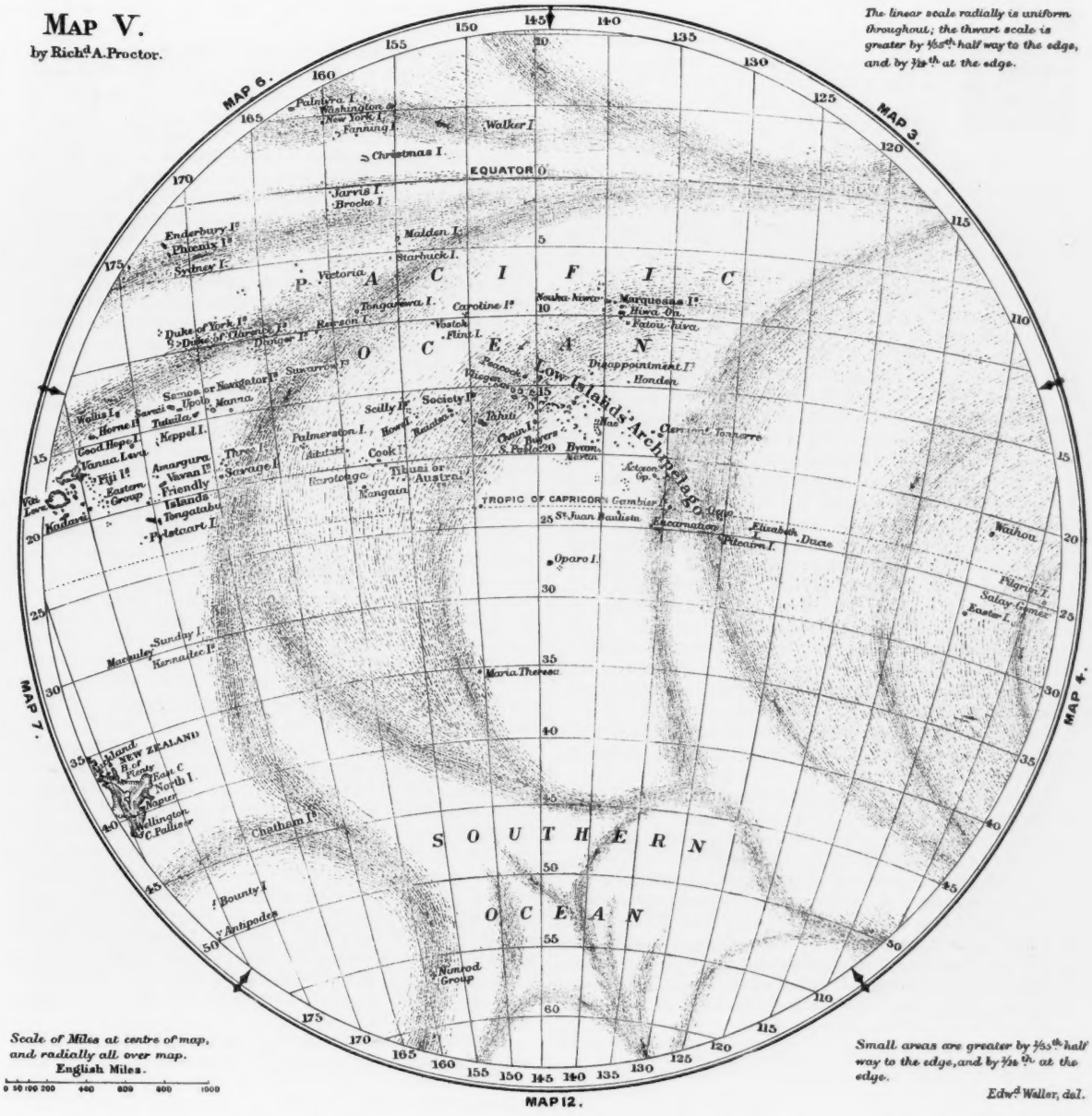


THE NIGHT SKIES IN THE SOUTHERN HEMISPHERE (LAT. 46° TO 24° S.)
AND THE
SOUTHERN SKIES IN ENGLAND (UPPER HALF OF MAP ONLY) AT THE FOLLOWING TIMES:

At 1 o'clock, morning, June 7.	At 11 o'clock, night, July 7.	At 9 o'clock, night, Aug. 7.
„ 12.30 „ „ June 14.	„ 10.30 „ „ July 14.	„ 8.30 „ „ Aug. 14.
„ Midnight, June 22.	„ 10 „ „ July 26.	„ 8 „ „ Aug. 22.
„ 11.30 o'clock, night, June 30.	„ 9.30 „ „ Aug. 3.	„ 7.30 „ „ Aug. 29.

STAR MAGNITUDES.

First . . . . ✱ Second . . . . ✱ Third . . . . ★ Fourth . . . . ✦ Fifth . . . . ▲



THE ONE-SCALE ATLAS.

WE give another map of this series, reserving an account of the method in which the sphere has been divided, and each map projected, till our space is less crowded.

THE WILD WINDS.

By "Stella Occidens."

GRIMM quaintly remarks in the chapter on elements in his "Teutonic Mythology" that it was quite natural to look upon "some female personages as prime movers of the whirlwind." Professor Fiske, however, tells us that in Norse mythology "it is the Devil who is proverbially active in a gale of wind."*

The first statement appears to be universally believed in Germany—at least it would seem so from the numerous legends and nursery tales in which "female personages" play an important part. In Vogtland, Northern Franconia, Thuringia, and across Lower Saxony, Frau Holda or Hulda, who may be regarded as a wind goddess, holds supreme sway. She drives about in a waggon, and flies through the air at will. She haunts lakes and fountains at noon, and at times she may be seen, a fair white lady, bathing in the sparkling water, and then disappearing under the waves, like the nymph Melusina.† Holda likewise belongs to Wuotan's "furious host," and, like Wuotan, can ride on the winds, clothed in terror, and accompanied by witches. Thus in Upper Hesse and the Westerwald, Holle-riding—to ride with Holle—is the same as a witch's ride.

At other times Holda is represented as an ugly old hag, with pointed chin, big teeth, a long nose, and bristling, thick-matted hair.‡ When she visits the pasture ground of the herdsmen she is seen dressed in a blue garment and white veil. She loves music and song under this appearance, and her lay has a doleful melody called Huldreslad. In the forests you see Holda, as an old woman, clothed in grey, marching at the head of her flock, milk-pail in hand. It is supposed that she carries off people's unbaptised children, and, according to a widespread belief, these little heathens, fell victims to Wuotan, or Holda, have thenceforth joined the "wütende Heer," or "furious host." It was also believed that Holda led an army of mice, for these were regarded as sacred animals, and were supposed to represent the souls of the little children.§

Holda also appears as queen of the mountain sprites, who are known as Huldrefolk. In Iceland they are called Huldumenn.‖ Holda resembles Freya, sister of one of the most celebrated gods of mythology, and wife of Odin or Wuotan. Like Holda, Freya loved music, spring, and flowers; she was queen of the elves and water-naiads, and could fly through the air at will in a waggon drawn by two cats.¶ She also, like Hulda, is mistress of the Valkyries in general, and adopts the babes that die unchristened into their host. Freya's dwelling is named Folkvångar, which means the plains on which the (dead?) folk troop together. The cat was sacred to her, as the wolf was to Wuotan and Holda, and that is why this creature is supposed to be the favourite of old hags and witches. In some parts of Germany they say, if a bride goes to a wedding in fine weather, "she has fed the cat well"—meaning that she has not offended the goddess of love.*

In Upper Germany, in Swabia, Alsace, Switzerland, and Austria, Perchtha, a being similar to Holda, or the same under another name, is recognised. Sometimes she is represented as bright and glorious, and at other times her name is used to frighten naughty children. In olden days she had her dwelling-place between Berche and Wilhelmsdorf, in the valley of the Saale. Possibly from this arises the fact that she is sometimes called Berchta. She is queen of the "Heimchen," or little unbaptised children, whom she steals away from their homes. At her command she makes them work, and she has a great waggon in which she keeps them. Naturally the people in Saale were very indignant with her for going off with their little children, and on this account she had to leave that part of the country. She bade a ferryman await her at midnight on the banks of the river Saale. When he arrived there he saw, according to the legend, "a tall, stately dame surrounded by weeping children, and demanding to be ferried over." She stepped into the craft, and, when she arrived at the other side, she made the ferryman return for the children, who were loudly weeping and lamenting. He did so much against his will.

Another time it is related that a spinning-girl, who was walking home from Neidenberg late one night, met Perchtha marching up the hill followed by a troop of Heimchen folk, who were pushing a heavy plough and waggon in front of them, whilst the rest helped to carry tools. They were all loudly complaining because they were so tired, and had no home in which they could rest. The spinning-girl, who was in good spirits, having completed a hard day's work, and knowing that a comfortable home awaited her, laughed aloud at their misery. Perchtha angrily approached her, and blew upon her, making her blind at a breath. The unfortunate girl could scarcely find her way home, and, being unable to see her work, she soon became poor and wretched, and had to beg for a living. A year later, as she was passing over this same mountain on the eve of Twelfth Night, she heard some one approaching her, and begged for an alms. It was Perchtha, who said, "This time last year I blew out a pair of lights, this year I blow them in again." She then blew in the girl's eyes, whose sight was restored.†

In the Middle Ages, Perchtha was represented as a white lady in snow-white garments, and she appears at night in princely houses and rocks the baby's cradle whilst the nurse sleeps. At other times Perchtha, like Holda, is represented as an old hag, and is called "Dame Precht mit der eisernen Nase," or "with the iron nose."‡

But Perchtha and Holda were sometimes replaced at the witches' nightly expeditions by Herodias, regarded erroneously as the daughter of Herod, who on account of her thoughtlessness, rather than malignity, had caused the beheading of John the Baptist. It is said that when the head was brought to her on a charger, she would have covered it with tears and kisses, but it drew back, and began to blow roughly at her. The hapless maid was whirled into empty space, and there she hung henceforth for ever. Only from midnight till first cockcrow she sits on oaks and hazel-trees; the rest of her time she floats through the air.§

In the "Sachsenspiegel" there are woodcuts and plates

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* [Our fair contributor, by combining these remarks, seems to suggest an inference not wholly complimentary to her sex.—Ed.]

† When Melusina leaves the castle of Lusignan, after her mermaid character is detected, she becomes a banshee. It is a common superstition among sailors that the appearance of a mermaid with her comb and looking-glass betokens shipwreck with the loss of all on board. The well-known story of Undine somewhat resembles that of the fairy Melusina.—J. Fiske, "Myth and Mythmakers," p. 96.

‡ Grimm's "Teutonic Mythology," chap. xx. p. 269: "When a man's hair sticks up in tangled disorder the peasants say, "He's had a jaunt with Holle." The description of Holda as an old hag recalls our nursery tale of the old witch "who went upon a broomstick ever so high, to sweep the cobwebs out of the sky"—generally represented as a hag with pointed nose and chin, and long teeth.

§ Fiske, "Myths and Mythmakers," p. 33. This recalls the story of the Piper of Hamlin and the fearful fate of Bishop Hatto.

‖ Grimm, "Teutonic Mythology," p. 271.

¶ Bullfinch, "Age of Fable," p. 412.

* Grimm, p. 304.

† Grimm, "Teutonic Mythology," p. 277.

‡ *Ibid.*, p. 280.

§ *Ibid.*, p. 285.

which represent the winds, half-symbolically, as faces or heads blowing—probably a fancy of very early date. For instance, in the "Iliad," when Achilles offers libations at the funeral pyre of Patroclus, the winds, at the command of Iris, raise the flames. The gentle Zephyr and the wild Boreas made the wild tumultuous winds blow and fanned the flames; but when the morn dawned the whistling winds returned to their caves.

The Valkyries, or swan-maidens, travelled through air and water, and belonged to Wuotan's "furious host." They were warlike virgins, mounted upon horses, and armed with helmets and spears. They guided the souls of the dying on the battle-field to Valhalla, the home of Odin, where he dwells with all the Aesir or gods.* He was desirous to collect a great many heroes in Valhalla, to be able to meet the giants on a day when the final contest must come. He sent the Valkyries down to every battle-field to make choice of those who shall be slain, and hence their name, which means "choosers of the slain." When they ride forth on their errand their armour sheds a strange flickering light, which flashes over the Northern skies, making what men call the "Aurora Borealis," or "Northern Lights." †

In the Edda a legend exists about seven-and-twenty Valkyries riding through the air. "When their horses shake themselves, the dew drops from their manes in the deep valleys." In "Balder Dead," Matthew Arnold refers to the Valkyries as follows:—

> And the Valkyries on their steeds went forth
> Toward earth and fights of men; and at their side
> Skulda, the youngest of the Nornies, rode;
> And over Bifrost, where is Heimdall's watch,
> Past Midgard Fortress, down to earth they came;
> There through some battle-field, where men fall fast,
> Their horses fetlock-deep in blood, they ride,
> And pick the bravest warriors out for death,
> Whom they bring back with them at night to heaven,
> To glad the gods, and feast in Odin's hall.‡

Odin or Wuotan answered to the Greek Zeus, the Alfadir or father of all. His wife is Freya, and she is the northern Thor or Baldr, according to Cox.§ Valhalla is the great hall in which Odin feasts with the heroes who have fallen in battle. These heroes amuse themselves by fighting when they are not feasting. When seated on his throne Odin overlooks all heaven and earth. Two ravens, Hugin and Munin, rest upon his shoulders, and two lions, Geri and Freki, crouch at his feet. Odin's furious host is the storm-wind howling through the air, and supposed to be the souls of slain warriors on their way to Valhalla. Wuotan takes special delight in the rushing of his wind-host over mountains and valleys in a great gale, leading on the Pitris. These live in the sky with Zama, and sometimes shine as bright stars. In the Aryan traditions the storm-wind is a host of Pitris, or one great Pitri, who appears as a fearful giant, and in other traditions Wuotan's furious host is a pack of wolves or wish-hounds, or a single savage dog or wolf. ‖

Wuotan has dominion over both air and water, walking on the waves and commanding the gale. In olden times they tell of Wuotan's wanderings with his waggon drawn by two wolves.

A resemblance can be traced between Hermes and Wuotan. The howling-dog or wish-hound of Hermes, whose appearance is a portent of death, and is merely the tempest personified. At night, Odin, like Hermes, was supposed to rush over treetops, accompanied by a host of dead men's spirits.*

Odin was himself also represented as a dog, and the howling wind was a great dog or wolf. "As the fearful beast was heard speeding by the windows and over the housetops, the inmates trembled, for none knew but his own soul might be required of him." In Odenwald it is believed that the passing of the Wild Huntsman is a sign of the approach of war. He is supposed to issue with his train from the ruined castle of Rodenstein, and pass through the air to the castle of Schnellerts.†

The German poet Bürger wrote a poem about Falkenberg, a keeper of a royal forest, who hunted on the Sabbath. During the chase he was joined by two huntsmen; one tried to persuade him to desist, the other led him on. At last, from amid the stormy clouds, a voice of thunder was heard saying:

> Be chased for ever through the wood,
> For ever roam the affrighted wild. ‡

Helplessly the Wildgrave was whirled through the air, and this dreadful chase, according to the legend, goes on still, and will last for ever. Behind him follow the hounds and horses. When the peasants hear these sounds in the passing storm they devoutly cross themselves. Our Herne, the Hunter of Windsor Forest, referred to in the "Merry Wives of Windsor," act iv. scene 5, resembles the above.

> There is an old tale goes that Herne the Hunter,
> Sometime a keeper here in Windsor Forest,
> Doth all the winter-time, at still midnight,
> Walk round an oak with great ragg'd horns,
> And there he blasts the tree, and takes the cattle. §

In the story of the Erl-king, the father tells his child that the siren's voice is but the rustling of the wind among the dry leaves; and the Niebelung king whom the child sees is but the mist rising over the plain.

Max Müller suggests that our nursery tale of Robin Hood is only a disguise of the Northern god Wuotan. ‖

NOTES ON AMERICANISMS.

By RICHARD A. PROCTOR.

FIX IT, in the elegant phrase "nohow you can fix it," the use of the verb to "fix," already considered (KNOWLEDGE for March, p. 114), is seen at its best. Sam Slick first introduced the phrase, I think. But it can hardly be considered a distinct Americanism, as by Bartlett. For, granted the verb "to fix" in the wrong American sense, we must accept any possible use of the word, grammatical or otherwise, as part of the usage.

FIXINGS. In this word, however, we have a distinct Americanism. We have already considered the expression "chicken fixings" as distinguished from "common doings." On the general use of the word "fixings," or, as it is more commonly pronounced, "fixins," we have what is precisely akin to the use of the word "doings." There are many other examples, as in the words "going" and "coming," used

* Cox, "Manual of Mythology," p. 281.
† Bullfinch, "Age of Fable," p. 409. Gray's ode, "The Fatal Sisters," is founded on this superstition.
‡ Bullfinch, "Age of Fable," p. 410.
§ Cox, "Manual of Mythology," p 280.
‖ Fiske, "Myths and Mythmakers," p. 77.

* This recalls Erckmann-Chatrian's story of the wild huntsman, Vittiakab, and how he sped through the forest, carrying away a young girl's soul.
† It is said that the sound of his phantom horses and hounds was heard by the Duke of Baden before the commencement of the last war in Germany.
‡ Fiske, "Myths and Mythmakers," p. 32.
§ Sir Walter Scott, "The Wild Huntsman," LLs 170–1.
‖ Max Müller, "Chips from a German Workshop," vol. ii., p. 259.

XUM

as nouns, "their goings out and comings in," such goings (on), and so forth.

FIZZLE. This word, used for a failure, is more commonly heard in America, perhaps, than in England; but it is only in this sense an Americanism.

FIZZLE, To. To fail. This usage is also English, though the vulgarism is not so common with us as in America.

FLAT OUT, To. To diminish in value—a Western phrase suggested by the diminished productiveness of metallic layers as they grow thinner.

FLATFOOTED. The significance of this word in America is very different from that of the French word *plat-pied*, identical though the words may be in their primary meaning. A French *plat-pied* is a mean, contemptible fellow; but an American "flatfoot" is a man who stands firmly for his party (and in America there is no higher praise than this). When General Grant said he had put his foot down, and meant to advance on that line if it took him all the summer, he conveyed, mixed though his metaphorical manner was, the American meaning of the expression "flat-footed." Another mixed way of using this flat-foot simile is found in the statement respecting a certain American demagogue that he had "a flat-footed way of saying things which impressed his neighbours, and was a rod in pickle for them."

FLOOR. To "hold the floor" is used in America as equivalent to our English parliamentary phrase "to be in possession of the House." Probably the expression had its origin in the Irish usage, "to hould the flure," applied to the longest lasting pair of dancers.

FLUME. A slant passage or channel for a stream of water to turn a mill, or for gold-washing, or the like. More familiarly used in America than in England, though thoroughly English.

FLUMMUX, To. This elegant expression, which in England means to use up, overwhelm, and generally obliterate (I think we have the elder Weller's authority somewhere for regarding it as Italian), is used in America in a different sense, meaning there to give in, faint, collapse.

FLUNK. This word appears to be familiar to American colleges, signifying an utter failure in recitation—while the verb *to flunk* signifies to fail utterly.

FLUNKY. By no means equivalent to our English flunkey. It is applied in American colleges to one who "flunks," and in the American Stock Exchange to one who ventures to speculate without sufficient knowledge, and so comes to grief. Probably all the usages of the words "flunk," "flunkey," &c., are associated with the Low German "flunkern," to flaunt or flutter, or with the Danish "flonkeren," to glitter faintly and but for a moment.

FLY, To, OFF THE HANDLE. To lose temper, get unduly excited.

FOLKS. The vulgarism "folks" for "folk" is common enough in England; but so much more common in America that it may almost be regarded as an Americanism. Bartlett points out the mistake which English writers make who, "in trying to imitate Yankee talk, make Americans say 'folk.'" Of course the double plural "folks" is as incorrect as "sheeps" would be, or "geeses," "mices," "mens," or "childrens."

FOREIGN. Americans differ from the English in their use of this word, for whereas we in England never call Americans "foreigners," Americans almost invariably apply the term to English folk. An Englishman would say, for example, of a gathering that Americans and foreigners were present; whereas an American would never think of distinguishing Englishmen in such a way from Frenchmen, Germans, Italians, and so forth. Although the population of America is seven-tenths foreign, the dislike to "foreigners" is intense, and yearly growing more so, especially among those who, though not quite the latest comers, are but one remove from being so.

FORTINO, for aught I know. See *Farzino*.

FRAUD. The use of this word in America is peculiar. Of course it is employed in its proper sense, to signify trickery or a trick. But it is also applied to persons and things in a sense which (*farzino*) is not known, except as an Americanism, in the old country. A person is called a "fraud," not, as Bartlett says, when he is a cheat, or at least not necessarily to signify that he is a cheat, but when he disappoints expectations. Thus an actor, of whom great things had been heard, but who should be judged not so clever as had been anticipated, would be described as a "fraud," but certainly not with the idea of attributing actual fraud to him. So a picture or a book or play which proved disappointing is called a "fraud," without attributing (necessarily) any trickery to the painter or author. In fact, the word is often applied to a landscape or other natural object or phenomenon. For instance, I remember hearing the Constellation of the Southern Cross called a "fraud" by an American who saw it for the first time under unfavourable conditions. (It always disappoints expectations unless first seen when nearly upright on the southern horizon.)

An amusing illustration of the way in which the American use of this word is commonly misapprehended in England occurred a few years ago at a meeting of the Astronomical Society. Mr. Burnham, of Chicago, the well-known observer of double stars, had pointed out a number of blunders in Admiral Smyth's "Bedford Cycle," and had spoken of the book as a "fraud," using the word in the strictly American sense. Unfortunately, it so happened that some of the mistakes were curiously suggestive of the process which schoolboys call "fudging," meaning any process by which results are made to look as if they had been fairly worked out when they have really been "cribbed." Fully persuaded that Mr. Burnham, in calling the "Bedford Cycle" a "fraud," meant to call the late Admiral Smyth a cheat, several fellows at the meeting denounced Mr. Burnham up hill and down dale. Now it is quite possible that under cross-examination he would have admitted that he did not think all the observations recorded in the "Cycle" had been really made. But to think a man not strictly truthful is one thing, to proclaim him a liar is another. Knowing the American use of the word "fraud," I thought it only just to my absent friend to point out that Mr. Burnham's calling the "Bedford Cycle" a "fraud" implied only that he had been disappointed in it. It is hardly necessary to say that in a gathering of Englishmen, only four or five of whom knew anything whatever about Americanisms, the explanation was greeted with ironical cheers, and supposed to be a mere bit of special pleading. But it was just all the same. The word "fraud," as Americans use it, no more implies (of necessity) intentional fraudulence than our English slang word "sell" implies of necessity an actual sale. By the way, the word "fraud," as thus used in America, is very nearly, but not quite, equivalent to our English "sell."

FREEZE, To. To "freeze to" any one means to cling to him. The expression is equivalent to our English slang "to cotton to" any one.

FREIGHT.—Besides its use as in England, this word, in conjunction with "car," signifies a carriage on a goods train. A "luggage van" on a passenger train is commonly called a "baggage car" in America; a "goods train" is called a "freight train," and what we ought to call a "goods car," a "goods van" (but probably railway men call it otherwise), is in America called a "freight car."

FRESH. Overbold. I have heard the word "fresh" used in this sense oftener in the South than in other parts of America.

FRESHET. Bartlett is careful to explain that this word, which he describes as now only in use in America, is really old English. I imagine that our English dictionary which did not give this word would be thought a poor one.

FRISCO. San Francisco is thus familiarly called in the States.

FROLIC, used for a "party on a frolic," seems to be a true Americanism.

FRONT. In England the back of a book is the part where the leaves are held together; and if we spoke of the "front" at all we should mean the part opposite the back. But in America the "front" of a book is the beginning, and the back of the book is the end. Thus Mark Twain, in his "Interview," speaks of looking up the word in the back part of Webster's Dictionary among the pictures, where we should say near the end of the book. So an American might speak of the words beginning with A and B as occupying the front of the dictionary. The usage is a trifle absurd.

FRONT NAME. The Christian name.

FROUGHY. Spongy, brittle, hence inferior in quality, as "froughy butter" for rancid butter. Commonly heard in the North of England.

FRUMP, To. To insult. This good old word, freely used by the Elizabethan dramatists, is still heard in New England.

FULL CHISEL. Full speed. Like our English slang "full split," "full swing."

FUNERAL. The most characteristic Americanism in connection with this word is its use in such expressions as "This is *my* funeral," meaning my special business, or, still more characteristically, "It ain't none of my funeral," meaning "It's no business of mine." There are parts of the States where "funerals" are the principal entertainments known to the public; hence they receive much attention from manager and the performers (other than the player of the principal part), and excite great interest among all classes of the community. This has led to the separation of the funeral from the burial. "Hamlet" is played without the presence of the gloomy prince; and by interposing a sufficient interval the occasion becomes one of something like merrymaking.

"DON'T!"*

A LITTLE manual of social proprieties, published under the name of "DON'T!" has obtained a wide circulation; and, as its negative precepts are inspired by much good sense and good taste, we have no doubt the tiny book will prove of real value. But, while good social habits are well worth forming, good intellectual ones are at least of equal importance; and it occurs to us that there is ample room for a manual that, in a series of brief and pithy sentences, would place people on their guard against the most obvious intellectual errors and vices. Possibly the objection might be raised that, while everybody wants to be cured of his or her social solecisms (if the expression may be permitted), none so little desire to be cured of intellectual faults as those who are most subject to them. Who, it might be asked, applies the moral denunciations of the pulpit to himself? Who would apply to himself the cautions of your proposed manual? Granted, we reply, that it is easier to bring home to the individual conscience the sin of eating with a knife than the sin of reasoning falsely or acting unjustly, we should still be glad to see a telling compilation of the most needed "Don'ts" for the use of all and singular who make any profession of an independent use of their intellects. Some of the maxims would be commonplace; but then the object would not be to lay down novel truths so much as to enforce old ones. Let us throw out a few at random, by way of a start:—

Don't think that what you don't know is not worth knowing.

Don't conclude that, because you can't understand a thing, nobody can understand it.

Don't despise systems of thought that other men have elaborated because you cannot place yourself at once at their point of view.

Don't interpret things too much according to your own likes and dislikes. The world was not made to please anybody in particular, or to confirm anybody's theories.

Don't imagine that, because a thing is plain to you, it ought to be equally so to everybody else.

Don't insist on making things out simpler than they really are; on the other hand—

Don't affect far-fetched and over-elaborate explanations.

Don't be overwise. Why should you make a fool of yourself?

Don't imagine that anything is gained by juggling with words or by evading difficulties.

Don't refuse to change the point of view of a question, if requested by an opponent to do so. A true conclusion cannot be invalidated by any legitimate process of argument.

Don't be inordinately surprised when a man who knows quite as much as you do on a given subject, and perhaps a little more, does not agree with you in your conclusions thereon. Try the effect of being surprised that you don't agree with him.

Don't keep on hand too many cut-and-dried theories. A foot-rule is a convenient thing for a carpenter to carry about with him; but a man who is always "sizing up" other people's opinions by a private rule of his own is apt to be a bore.

Don't be in a hurry to attribute bad motives or dishonest tactics to an opponent. Try to get an outside view of your own motives and tactics.

Don't refuse to hold your judgment in suspense when the evidence is not sufficient to warrant a conclusion.

Don't imagine that, because you have got a few new phrases at your tongue's end, you have all the stock-in-trade of a philosopher, still less that you are a philosopher.

Don't try to express your meaning till you have made it clear to yourself.

Don't argue for the sake of arguing; always have some practical and useful object in view, or else hold your peace.

Don't grudge imparting what you know, and do it with simplicity.

Don't prosecute any study out of idle curiosity or vanity. If you have time for intellectual work, be a serious and honest worker.

Don't be too eager to "get credit" for what you do.

Don't undervalue the work of others.

Here we have a score or so of maxims of the prohibitive kind, and the number might be indefinitely increased. There is no doubt the intellectual progress of the world might be hastened, and the good order and harmony of society greatly improved, if these precepts and others like unto them were more carefully observed. Whether we get another "Don't" manual or not, sensible people should think of these things, and try to bring their intellectual habits at least up to a level with their social ones.

* From the *Popular Science Monthly*. A charming little article by the Editor. Some of these "Don'ts" should be printed in gold letters in our studies; for we students of science don't always remember these excellent rules.

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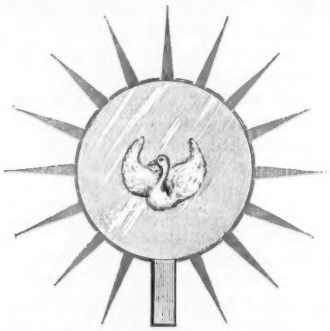
THE JAPANESE MAGIC MIRROR.

By Dr. R. F. Hutchinson.

I HAVE, at last, realised the longings of my boyhood, and am in possession of a Japanese magic mirror. I have a hazy recollection of an attempt—I think, by Sir D. Brewster—to solve the mystery to the learned, but its effect on me was to sink me deeper in the mire of mystification. Even now, after repeated and careful experiments, I am *in statu*, and can offer no explanation of the optical mystery, nor can many to whom I have exhibited it. If you, or any of your readers, can enlighten me, I shall be deeply obliged.

I send you a rub of the back of the mirror, which will help you to understand the magic. The body is bronze, the face is said to be steel. It may be silvered,



and, as far as I can make out, is quite plane. Your face is reflected, as in any other mirror, though perhaps not so clearly as in our own looking-glasses.

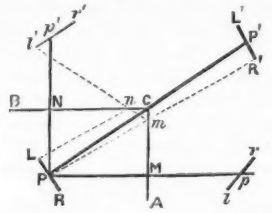
On the reverse a goose or swan is stamped out in relief, enveloped in its own plumage, and standing out about ·05 inches above the chequer-work of the ground. Now for the mystery. Reflect the sun with an ordinary plane mirror, and you obtain a replica of the face of the mirror on the wall, slightly smaller than the original. Reflect the magic mirror, and you see, not the replica of the face, but the image of the goose, surrounded by a glory of triangular rays. And, what is very strange, you do not see the image you have on the reverse, but another one altogether; thus, you see a dot on the beak, which is non-existent in the image at the back, and you do not see the drop of ink which you may place on the neck; further, you do not see the surrounding chequer-work, on the wall. Now, how is this? I cannot explain.

Another very remarkable phenomenon is witnessed on handling the mirror in sunlight. You are distinctly aware of *two* surfaces, and, if you move the mirror, the particles (?) of the two surfaces pass each other in opposite directions, like microscopic iridescent aërolites; one shown passing, say, from north to south, and the other in the opposite direction. This is very strange to see. Further, if you look for a second at the surface in the sun, *you* cannot see the bird, *but your companion sees it on your face.* The natives to whom I have shown it are amazed, and regard it as witchcraft (*jádū-gări*).

Another Japanese curio which I greatly value is a magnificent crystal ball, about three inches in diameter—and this, too, is great medicine to the natives, exhibiting, as it does, a lovely miniature panorama of the surroundings; but what amazes them is, that, though cold as ice, they cannot hold it in their hands in the sun, inasmuch as it burns like fury, and I often have to save it from being dropped by them like a hot potato.

OUR PUZZLES (SOLUTIONS).

PUZZLE XXVIII.—When anyone looks at his reflection in a mirror, he sees himself not as his friends see him, but with his left side doing duty as his right, and his right side doing duty as his left. But suppose AC, BC to represent the horizontal sections of two mirrors at right angles, R and L the right and left side of a person, P, facing the corner C. Then there will be an image *r l* as if behind mirror AC, and an image *l′ r′* as if behind the mirror BC. But there will also be an image R′ L′ as if beyond C (PC=CP′), and situate as shown. (The dotted line P*m* *n*L,



shows how the point L is seen from P in direction P*m* and as if at L′.) This image appears to the person himself at P, as he appears to his friends, the right side R′ facing the observer's left, and the left side facing the observer's right.

It is not necessary to have mirrors such as AC, BC. Two narrow strips of glass, supposed to be shown in section at *n*C and *m*C, will suffice to show the observer his own image, as if at P′. In fact all that is necessary in such cases is that a space should be mirrored near C so large that if this mirrored part were an opening in the wall, the whole of the observer's person set at P′ would be visible from P.

Wherever the observer may go within the space BCA he will see his image at C. If the two vertical mirrors *n*C and *m*C, which are supposed to meet in a vertical line at C, be set in rotation about a vertical axis through C, the observer at P will see his image at C during one quarter of each rotation; and if the rotation is sufficiently rapid he will see his image apparently unmoving all the time.

PUZZLE XXIX.—It will be easily seen by the student that if BC, AC are two mirrored sides of a room, the horizontal ceiling of which is also a mirror, then an image will further be formed as if beyond the corner above C, and at the same distance beyond that corner that that corner lies from P. This image will be inverted. (The student will find it a useful exercise to draw lines corresponding to P*m*, *mn*, *n*L in the simpler case just dealt with, showing how the various parts of the inverted image above P′ will be seen respectively on the ceiling, and on the two mirrored walls CA, CB, close by the corner.) Thus, looking at any of the top corners of the room, if walls and ceilings near those corners are all mirrored, the observer will there see his face (and figure if the mirror surfaces extend far enough) inverted. He will see the like if he looks at the four lower corners (similarly mirrored).

Thus there will be eight inverted images at the eight corners of the room, wherever the observer be situate inside the room.

PUZZLE XXX.—If the twelve edges of the room (that is the places where walls meet walls, floors, and ceilings) be lined with mirrors to a sufficient breadth, the observer, wherever he be situate, will see twelve images of himself along the edges, viz. four upright in the four vertical edges, and eight inverted in the edges bounding floor and ceiling. He will further see eight inverted images at the eight angles of the room.

If the six plane faces of a room (all rectangular) be mirrored throughout their extent, an observer in the room, besides twelve images in the edges and eight in the corners, will see six images in the six faces (not to count reduplications—which can never be fully seen), or twenty-six images in all.

"THE SCIENCE OF THOUGHT," BY F. MAX MÜLLER.*

THIS new work of Professor Max Müller's will not find favour with such a large circle of readers as his charming "Lectures on the Science of Language," which have done so much to popularise the study of comparative philology in this country. "The Science of Thought" is a trifle too scholastic, abstract, and philosophical to captivate the general reader, but the linguistic student will find it worth studying on account of the valuable and interesting philological matter it contains. More than three hundred pages are devoted to the origin and growth of speech, to roots and formation of words.

Our author still fondly clings to the belief that we cannot think without words—"that language and thought are inseparably united." This is one of the idols of Professor Max Müller. It may be that we are *now* such slaves to words that we think in and with them, but it was not always so. And surely our own experience in this matter counts for something, in spite of the dicta of logicians to whom thought and language are inseparable. Are we not conscious of thoughts too deep for utterance, and of imaginings that soar far beyond the reach of speech? Do not our words call up thoughts and feelings of the past and produce sensations of pleasure or pain? We cannot regard language, highly as we value it as a mark of intelligence, as the only "true history of mankind." Is not language, written or unwritten, only *one* phase of mental activity? Are not works of art, inventions, &c., indications of mental growth as well as language?

The science of thought is, in our opinion, quite distinct from the science of language; each may throw light upon the other, but the genesis of the word will by no means explain the genesis of the antecedent thought. Each has its own history, and the development of the one is independent of the other. Philologists have, for the most part, left untouched the "origin of speech," and have confined themselves to the origin of roots—products of grammatical analysis—none the less real, on that account, than are the *elements* which are arrived at by a chemical analysis. We are glad to find that Prof. Max Müller is of opinion that the linguistic student should not lose sight of the beginnings of speech, but should be on the look-out for whatever may throw light upon what may be regarded as the most fascinating part of philology.

The bow-wowists and pooh-poohists get, as usual, some hard raps from the Professor, but we are rejoiced to learn "that interjections and imitations of natural sounds deserve the serious attention" of those who have to do with the origin of roots, the ultimate elements of language. In fact, he concedes more than we expected, for he is bold enough to declare the Sk. root *pûy* (in Lat. *pus*, *puteo*; Eng. *foul*, &c.) "was very likely the residuum of a number of sounds accompanying the acts of primitive men when rejecting something unpleasant and expressing their disgust."

The ding-dong theory, first started by Prof. Heyse, "that everything which is struck rings," is now given up in favour of Noiré's more recent theory of the origin of roots and concepts. "Noiré," says Prof. Max Müller, "begins his argument by pointing out a well-known fact, that whenever our senses are excited and our muscles hard at work, we feel a kind of relief in uttering sounds . . . particularly when people work together, when peasants dig or thresh, when sailors row, when women spin, when soldiers march, they are inclined to accompany their occupations with certain more or less rhythmical utterances. These utterances, noises, shouts, hummings, or songs are a kind of natural reaction against the inward disturbance caused by muscular effort. They are almost involuntary vibrations of the voice, corresponding to the more or less regular movements of our whole bodily frame. They are a relief rather than an effort, a moderation or modulation of the quickened breath in its escape through the mouth. They may end in dance, song, or poetry . . . . These sounds possess two great advantages—they are signs of repeated acts, acts performed by ourselves, and . . . . continuing in our memory as signs of such acts . . . . These sounds being uttered from the beginning, not by one solitary individual only, but by men associated in a common work and united by a common purpose, possess the great advantage of being understood by all" (p. 300–1). On p. 552 we are told that roots owe their origin to the *clamor concomitans* of our early social acts. . . . The history of language dates "from the first appearance of roots or signs of self-willed acts, because it was by these roots only that afterwards the objective products of such acts could at one and the same time be both conceived and named. . . . The very fact that roots had to be explained as sounds accompanying the acts of many people working in common, would explain the original variety of such sounds—a variety due quite as much to the actual variety of individual sounds as to the more or less delicate perceptive remembrance and power of imitation possessed by different members of the same gang. No doubt every one of these sounds was uttered at first by one individual only, for everything in the world is at first done by one individual only; but that individual must be a leader of men, and the true leader of men is he who leads while being led. From the process of leading while being led, two results would naturally follow:—If these sounds were to answer their social purpose, that is, if they were to be understood, it was necessary either that one individual sound should in the end prevail and the rest vanish, or that by a kind of friction and compromise the various sounds which had been started should be merged into one. The result in both cases would be much the same; the fittest sound would survive, the others would slowly vanish unless they could be made to answer some new and special purpose" (p. 362).

This view of Noiré's is but one aspect of the subject, and does not appear to us a satisfactory solution of the problem how men first began to speak. We may still hear men in gangs working together and uttering inarticulate sounds, but they do not appear to have any special importance in relation to language nor seem better adapted, as the first elements of speech, than other cries and exclamations. We cannot believe that speech was wanting to men until they had so far progressed as to make tools and to work in gangs or companies. Hunting would probably be as primitive an occupation as digging, but the hunter would not give utterance to his emotions if he desired his efforts to be successful. The vocable for "dig" arose long before men worked together with spades or hoes. The Sanskrit root *khan*, to dig, is an attempt to imitate the scratching or scraping sound produced by primitive man in making a hole with his fingers or with a flint or bone scraper (cf. the Sk. kha*n*akhan*â*ya, to rustle—*i.e.*, to make the sound kha*n*a-kha*n*a).

Our English words *dig* and *dike* can be traced to a root,

* Longmans, Green, & Co. London. 1887.

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dhigh (*dhagh*), which originally represented, perhaps, the dull sound of thumping, pounding, &c. It signifies to knead, form, mould, and to it must be referred English *dough*, Lat. *fingere*, *figura*, *figmentum* (cf. Sk. *deha*=*dhegha*, a body). The earliest and rudest sounds may have been first those natural ones that accompany feeling and sensation, then onomatopœias, rough imitations of those sounds that would naturally appeal to the ear, which organ it has been observed is far more ideal than the eye. We would, with Herbert Baynes, reverse the assertion of L. Geiger and say that "Language has sprung from the ear, from sound, and not from the eye and light." And we know very well that words like *clear*, *bright*, &c., are derived from roots that originally referred to sound. From what is *loud* we can pass on by metaphor to what is *clear* or *bright*. Our words *blithe* and *bliss* go back to a root meaning to *shine*, which again is connected with a root denoting loud noise. Such a root as Sanskrit *dhû* (of which we have allied forms in *dhuksh*, to kindle; *dhûp*, to smoke; *dhur*, *dhûrv*, to throw down; *dhâv*, to run, wash) is the outcome of a group of onomatopœic roots imitative of the howling wind, the roaring fire, rushing water and rolling stones, and the phenomena connected with them, as the shaking and rustling of trees, flashing of fire, &c. Hence such derivatives as Sk. *dhûti*, dust; *dhûma*, smoke, fume; Old Slavic *da-chŭ*, breath. It has been urged against onomatopœias that they are not fertile, and produce no offspring. It may be so *now* perhaps, because our wealth of words makes us independent of this mode of adding to our vocabulary. But an onomatopœic vocable had formerly a numerous progeny. Take, for instance, the root *bhla* (*bhlad*); from this have sprung the English words *blow*, *blabber*, *bladder*, *blast*, *blare*, *bluster*, *blood*, *bloom*, *blossom*, *bloated*—cf. Latin *flare*, *flatus*, *flumen*, *flos*, *flamen*; Greek, φλύειν, παφλάζω, φλασμός, &c. If we look at one of Professor Max Müller's roots (119*a*, p. 631) denoting "noise (inarticulate)," we shall find it by no means unproductive.

A Sanskrit dictionary gives us numerous derivatives of the root kruç, among which we note words for reviling, pitying, lamenting. The same root furnishes us with names for jackal (kroshtu) and osprey (ut-kroça).

In Sanskrit, a highly developed and literary language, and in many respects very artificial, we find abundant remains of onomatopœic roots, which are only a small sample of what one finds in any of the *living* Hindu dialects descended from Sanskrit. We find, however, in Sanskrit *kû*, *kûj*, cry or sing as a bird; *kuñj*, to rustle; *guj*, *guñj*, to buzz; *ghu* (*ghu-r*, *ghu-s*), to utter a deep sound; *ghurughurâya*, to snore, whistle; cf. Marathi *ghu-ghu*, the hoot of the owl or pigeon; *ghor*, the death-rattle (Sk. *ghora*, terrible), a swollen river, frightful, &c.

But we need not go on to multiply instances of the onomatopœic element in language. We have ample proof of its existence and influence. We need not be ashamed of it—though we may indeed marvel that such a wonderful work of art, as language undoubtedly is, has sprung from such rude beginnings. It renders, however, what, at first sight, seems wonderful and mysterious, simple and intelligible.

Prof. Max Müller ably defends the fundamental principles laid down by Bopp as against the followers of the new school of Comparative Philology. He discusses many interesting points connected with the old theory that some suffixes contain "elements of independent significance." Our *upward*, turning or bending up, he compares with the Sanskrit *ud-ak*, which has the same meaning, from the preposition *ud*=*up*, and the root *añc*, to bend. He has a very long discussion on the suffix *tâti* (Lat. *-tas*, Eng. *-ty*), the conclusions of which are by no means convincing.

In taking leave of our author, we only hope that he may have health and leisure to write the other "treatise" he proposes to give to the world, namely on "the Self that seems to see and seems to think"—and "Who that Self is.'

Gossip.

By Richard A. Proctor.

A CORRESPONDENT writes us a letter beginning—

> Dear Sir,—Matter is spirit, is it not? Or what is spirit, or what is matter?

and so forth. I ask in answer simply—not, I fear, in the right spirit—Does it matter?

* * *

A CORRESPONDENT rebukes me for regarding it as a mere superstition that after a misdeal there will be a singleton among the hands next dealt—because "he feels bound to regard it as a fact, though depending on a law not yet understood." In other words, he does not happen to have noticed any case when, after a misdeal, there has not been one singleton at least among the hands next dealt. No amount of such experience, however, would prove that to be a fact which in the nature of things cannot be. On the contrary, a single experience to the contrary proves that the supposed fact is no fact: and I have observed at least a score of cases in which there has been no singleton in the deal following a misdeal. Science cannot, however, deal seriously with any idea involving the sequence of an event as if *caused* by another, when, in the nature of things, there can be no causation.

* * *

PLAYING without shuffling, or with very little shuffling, there will be fewer singletons, as there will be fewer irregular hands, than when the cards are freely shuffled—and for very obvious reasons. When the cards are taken up after a hand has been played they are in tricks, and among the tricks a considerable number have all the four cards of one denomination. Any such trick not separated by shuffling, will in the next deal give one card of the same suit to each player, and so will diminish the chance that any player will get but one card of that suit. A few undivided tricks will greatly diminish, then, the chance that any player will get a singleton of any suit.

* * *

WHEN, however, the deal following the misdeal is from another pack the chance of a singleton cannot be increased or diminished by the misdeal, through the operation of any law, understood or misunderstood—*unless* the interruption of the play leads to a fresh and extra-thorough shuffling of the pack to be used for the next deal. Such shuffling to some degree increases the chance of a singleton, and it is to be remembered that the odds are always greatly in favour of a singleton occurring, except when the cards are scarcely shuffled at all, when as the play proceeds there is a decided tendency to equally divided hands.

* * *

A CORRESPONDENT inquires why I removed the chapter on "Other Universes" from Guillemin's Heavens as revised by me; and my opinion on the statements as to the distance of certain clusters in that chapter. I regard these statements as without any foundation whatever in fact, and I removed the chapter because I thought—or rather, I *know*—that we have no sort of evidence in regard to external galaxies.

* * *

SERIOUS illness in his family, and resulting anxieties and losses, prevent the Editor from devoting so much attention as usual to "Gossip" this month. For a like reason no new puzzles are given, as the Editor has not had time to devise any which seemed suitable. Hereafter "Mathematical Recreations" will take the place of the Puzzles.

* * *

THE undersigned feels sure that Mr. Proctor's many friends will be grieved to hear that a deep shadow has fallen on the home which he has temporarily pitched in America in the loss of two children, one of them a bright and charming boy of five years, through that terrible slayer of the Innocents—scarlet fever. These columns offer a convenient place for our expression of sympathy with Mr. and Mrs. Proctor and their family. EDWARD CLODD.

Reviews.

Overwork and Premature Mental Decay: its Treatment. By C. H. F. ROUTH, M.D. Fourth Edition. (London: Baillière, Tindall & Cox. 1886.)—Reading through Dr. Routh's eminently plain, sensible, and practical essay, we do not wonder that it has already reached its fourth edition. In our existing condition of incessant toil after wealth, position, and pleasure, with men and women essaying to accomplish three or four times the amount of work done by their grandfathers and grandmothers in the same time; with our extraordinary facilities for rapid locomotion, and with our purely artificial condition of existence, what wonder if the overwrought machine gives way, and the originally strong man becomes the veriest wreck of his former self? How and why this result supervenes, and under what treatment its victim may be restored, Dr. Routh here tells us, and his little book may be commended as a thoroughly trustworthy guide to all upon whom worry and care are in any degree beginning to tell.

Alexander's Empire. By J. P. MAHAFFY, D.D., with the collaboration of ARTHUR GILLMAN, M.A. (London: T. Fisher Unwin. 1887.)—Nothing probably is more familiar to the student of history than the story of the succession of victories by which the mighty Macedonian subjugated so large a proportion of the then known world; but the manner in which the different parts of his dominion waxed and waned until they were finally swallowed up in that *edax rerum* the Roman Empire, is by no means so well known. It is, then, to the elucidation of this that the narrative of Professor Mahaffy is addressed. By far the most interesting part of his work is that in which he traces the influence of Hellenism on the conquered peoples, and shows to what an extent it dominated the ideas of Rome itself. In this connection chapters xiv., xx., and xxxii. may be singled out as well worthy of study. With reference to the chronicles of the numerous wars into which the members of the once consolidated empire plunged, we fear that they will require more sustained attention than the larger proportion of readers will be either able or willing to bestow. In fact, so confusing are the iterations and reiterations of certain names, that Doctor Mahaffy thoughtfully concludes with a "List of Names easily confounded." The illustrations, of which there are no less than forty-four, are one and all apposite, and show the perfection to which Greek art attained in architecture, sculpture, and numismatics.

The Deviation of the Compass in Iron Ships. By W. H. ROSSER. Second edition. (London: Jas. Imray & Son. 1887.)—It has been known certainly ever since the twelfth century that a magnetic needle, so balanced as to play horizontally about its pivot, points more or less approximately to the north according to the part of the world in which the observation is made. In fact, the Chinese claim to have employed it in navigation from a period of the hoariest antiquity. Now, as long as the directive force actuating the needle resides solely in the earth itself, the phenomena exhibited are sufficiently simple, and the compass is a comparatively trustworthy instrument; and as this condition of things obtained in effect as long as ships were built of wood alone, the compass has for centuries been an aid of priceless value to the navigator. But with the substitution of iron and steel for wood in shipbuilding a total change has taken place in the circumstances under which the compass is employed; for every iron ship that is built becomes herself a gigantic magnet, with the direction of its polarity dependent upon the position which the vessel occupied with reference to the magnetic meridian during the time she was being built, with the result that the most remarkable deviations are found in the infinitely less powerful magnets of the compasses on board. In Mr. Rosser's excellent work the methods of ascertaining the exact amount of deviation of the compass on board of an iron ship, both on an even keel and when heeling to any extent, of the mechanical methods of correcting such deviation, and of the tabulation of residual errors at all azimuths, are lucidly laid down and explained in language which must be intelligible to every one competent to navigate a vessel at all. Whether for sea use, for the Board of Trade examination, or for the professional compass-adjuster, no more useful or intelligible book than the one before us has, so far, been published.

Shoring and Its Application. By GEO. H. BLAGROVE. (London: Crosby Lockwood & Co. 1887.)—Here is another excellent and thoroughly practical volume on a subject, the importance of which in connection with public safety can hardly be over-estimated. Within the compass of eighty-nine pages, Mr. Blagrove deals with the whole art of shoring, from its simple application in preventing the fall of old and decaying walls and partly destroyed houses, up to the complicated devices for the support of such structures as St. Alban's Abbey and Beverley Minster. Our author has made a distinct and valuable addition to the literature of the building art.

Messrs. Longmans send us an excellent *Geographical Reader* adapted for the Seventh Standard; and we have also to acknowledge the current number of their magazine, of which "Allan Quatermain" is the attractive feature; also of the *American Naturalist*, in which the valuable papers on the "Significance of Sex" are completed.

Our Whist Column.

BY "FIVE OF CLUBS."

THE following game was played recently at Melbourne. The whist editor of the *Australasian* played hand *Y*. The point of the game lies in the play by *Y* of a small diamond at trick 2. It will be seen by his notes that *Y* considers the play, though unusual, to have been justified by the position. I cannot but think he risked the loss of the game by passing. This opinion is not based solely on the error in calculating chances into which *Y* fell, as his notes show. That error, by the way, is very natural. It was made by the well-known mathematician, D'Alembert (when, however, the mathematics of chance problems was as yet in its infancy), in dealing with the toss of a coin. There are three events, he said: two heads, two tails, and one of each; therefore the odds are two to one against the last. They are in reality even, because one of each may occur in two ways—head tail or tail head.

THE HANDS.

B { S. (*trumps*).—Kn, 8, **6**, 5, 2. H.—8, 6, 5, 4. D.—10, 7. C.—10, 6. }

Y { S. (*tps*).—K. H.—Kn, 9, 3. C.—8, 7, 4, 3, 2. D.—K, 8, 4, 3. }

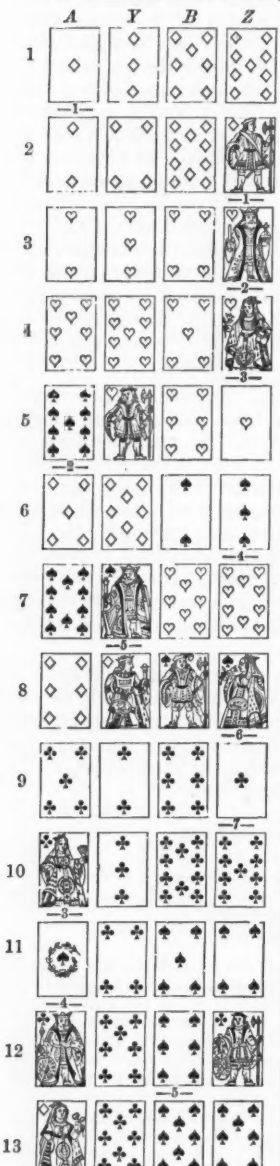
B / Y Z / A leads. *Tr.* S. 4.

Z { S. (*tps*).—Q, 7, 4, 3. H.—A, K, Q, 10. C.—A, Kn, 9. D.—Kn, 9. }

A { S (*trumps*).—A, 10, 9. H.—7, 2. D.—A, Q, 6, 5, 2. C.—K, Q, 5. }

A B play against *Y* and *Z*. Score:—*A B* four; *Y Z* four.

Card underlined wins trick; card underneath leading next.



And *Y Z* win the odd trick and the game.

NOTES BY THE WHIST EDITOR OF THE "AUSTRALASIAN."

Trick 1.—At the end of this trick *Y* knew that there were at most two Diamonds of unknown comparative values, to distribute between *Y* and *Z*. The only possible arrangements were:—*B* two Diamonds, *Z* none; *B* one, *Z* one; *B* none, *Z* two. Consequently, on the assumption that *A* led from five Diamonds, the odds were two to one that *B* or *Z* was void of the diamond suit. Again, in case that the distribution turned out to be one Diamond with *B* and one with *Z*, it was exactly an even chance that *Z* would be able to win the trick. Of course *Y* was bound to bear in mind the contingency that *Z* had begun to call for trumps. But with the score at four all strong trumps in *Z*'s hand would win without his resorting, on the first opportunity, to a call for a trump lead.

Trick 2.—Without reference to the wisdom or otherwise of the adoption generally of the system of American leads, *A* ought to have played the diamond five rather than the Diamond two. For by leading the Diamond two he practically relieved *Y*'s mind of all doubt as to whether *Z* had or had not begun at Trick 1 to call for trumps. *Z* was right in playing the Diamond four. For on the contingency that one or other of the two players behind him was void of the Diamond suit, it was an even chance it would be *B* who would trump; and on the other contingency that there was a Diamond in each of the hands, it was also an even chance, as has been already pointed out in the note on Trick 1, that *Z* would be able to win the trick. Again, if *Y* had put on the Diamond king and won the trick, he could not have led a Club from a suit of five headed by the eight. He must have led the Heart knave. But with his weak cards he wanted guidance from *Z* as to what to do in the interests of the combined hands. Besides, in any case he blocked the opponent's suit, and this was pretty well all the help he was able to give towards winning the game.

Trick 3.—*Z* had four trumps, together with Club ace and the complete command of Hearts. Also the command of Diamonds was with *Y*. Consequently at this stage of the game the Spade three looked like the best lead.

Trick 6.—*A* very naturally placed the Diamond eight with *Y*, and the Diamond king with *Z*. But as the event proved, both these cards were with *Y*.

Trick 8.—*Y* now played the Diamond king with deadly effect. *B* properly trumped with the knave, not with the eight, because he wished to puzzle *Z* as to the position of that card. But as the Club ace was with *Y*, the game was lost to *A B* at the next trick.

One of Mr. F. H. Lewis's published games, which has been reproduced in *The Australasian*, admirably illustrates the point of keeping back the best card of a plain suit. But in that example the necessity of that line of action was not developed till near the end of the play of the hand, while in the present hand the possibility of having to resort to it was suggested to *Y* at the end of the very first trick.

NOTES BY "FIVE OF CLUBS."

Tricks 1 and 2.—*A* is evidently not a believer in the American leads, according to which the five should have been led second round. *Y*'s play of the four, where usually the best card would be played second round, is the point of the game. Holding the eight himself, he knows, from the play of *B* and *Z* to the first round, that only ten, knave, and queen can possibly be held by *B* or *Z*, unless one or other is signalling; and from *A*'s lead, indicating five Diamonds in *A*'s hand, *Y* knows that only two of these high cards (it matters little which two) can be between *B* and *Z*—possibly but one. (There must be one, and, if one, it must be either queen or knave, since otherwise *A* would not have followed with the small card.) In the more probable event that two cards lie between *B* and *Z*, it is an even chance that one or other is void. For calling these cards knave and ten, the possible arrangements, all equally likely, are:—*B* holds both, *Z* none; *B* holds knave, *Z* ten; *B* holds ten, *Z* knave; and *B* holds none, *Z* both. If there is only one Diamond between *B* and *Z*, it is, of course, an equal chance that *B* or *Z* holds it. It is an even chance, in all events, that *B* or *Z* can take the trick, supposing *Y* plays his small card. At the score I cannot recognise the expediency of keeping back the king to block *A*'s long suit. The odd trick is apt to depend on other considerations. I should have played the king, and, on the fall of the other two Diamonds, have led the Diamond four, enabling *Z* to ruff under favourable conditions. The 4th, 5th, and 6th tricks would thus have been identical with the 3rd, 4th, and 5th in the actual game; and *Y Z* would have needed only three tricks to make the odd. If *A* had gone on with the Diamond queen, *Z* would have captured her, leading a Heart for *Y* to win by overruffing *A*; and the ace of Clubs would have made the odd trick sure. If *A* had led Club king, it would have fallen to *Z*'s ace, *Y* would have overruffed Hearts as before, and leading a Diamond, *Z* would have made the odd trick by ruffing. *Y* could not know that *Z* could thus support his strategy; but I submit that this is the right sort of strategy for securing the odd trick. Had the play been for or against bringing in a long suit, *Y*'s holding back the king might have been justified.

Trick 3.—At the score the lead seems just.

Trick 5.—Here, I think, *Z* should have led trumps (holding length in them). The odds are in favour of *A* being able to ruff, as he certainly holds three Diamonds, whereas *Y* cannot hold more than two. Forcing the enemy is certainly not *Z*'s game at the score.

Trick 8.—*Y* plays his best Diamond effectively, but not more effectively than he might have played a losing Diamond at Trick 3, had he taken Trick 2 with his king.

The best proof that *Y* gave up some of his chances by playing the small Diamond may be seen in the play of the game when the Diamond knave and ten are interchanged. It is obvious that had *B* held the knave *Y*'s actual play would have lost the game. But the plain strategy I have suggested above would have won the game even in this case, as the following play shows:—

	A	*Y*	*B*	*Z*
Trick 1.	D A —1—	D 3	D 7	D 9
„ 2.	D 2	D K —1—	D Kn	D 10
„ 3.	D 5	D 4	C 6	S 3 —2—
„ 4.	H 2	H 3	H 4	H K —3—
„ 5.	H 7	H 9	H 5	H Q —4—
„ 6.	S 9 —2—	H Kn	H 5	H A
„ 7.	C K	C 2	C 10	C A —5—
„ 8.	S 10	S K —6—	H 8	H 10
„ 9.	D 6	D 8 &c., &c.	S Kn	S Q —7—

THE FACE OF THE SKY FOR JUNE.

BY F.R.A.S.

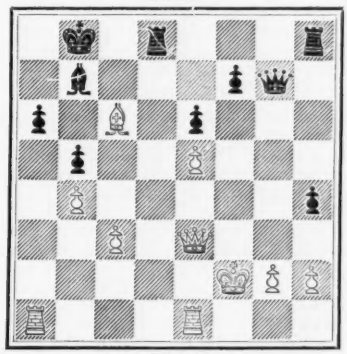
THE sun may be watched for the isolated spots which have somewhat unexpectedly begun to reappear at intervals on his surface. The night sky will be found depicted on Map VI. of "The Stars in their Seasons"; but there is no real night during the entire month in any part of the British Islands, twilight persisting from sunset to sunrise. From the 19th to the 22nd in London the sun will be 16h. 34m. above the horizon. Mercury is an evening star throughout June, and does not set until nearly 10 o'clock at night about the 18th, at which date he may be easily detected with the naked eye after sunset over the N.W. by W. part of the horizon. Venus is also an evening star, and is the most brilliant object in the sky. As it happens, she sets at her latest (11h. P.M.) about the 18th, the same date that Mercury does. Her figure in the telescope is now approaching that of the Moon when in her first quarter. Mars is invisible. Jupiter is approaching the west, and must be looked for as soon after sunset as he is visible. He will be found to the E.N.E. of Spica Virginis ("The Stars in their Seasons," Map V. or VI.). The certainly visible phenomena of his satellites of course decrease in number. On the 4th Satellite III. will be occulted 49 minutes after midnight. On the 5th Satellite I. will begin its transit at 11h. 58m. P.M.; as will the shadow it casts at 12h. 55m. On the 6th the same satellite will reappear from eclipse at 12h. 18m. 33s. P.M., as will Satellite II. subsequently at 12h. 54m. 29s. On the 7th the egress of the shadow of Satellite I. happens at 9h. 36m. P.M. On the 13th Satellite II. will be occulted at 10h. 49m. P.M., as will Satellite I. afterwards at 11h. 0m. On the 14th the egress of Satellite I. from Jupiter's disc will occur at 10h. 27m. P.M., its shadow following it at 11h. 31m. On the 15th the egress of the shadow of Satellite II. takes place at 10h. 7m. P.M., and the ingress of the shadow of Satellite III. at 10h. 26m. The latter will pass off Jupiter's opposite limb twenty minutes after midnight. On the 21st Satellite I. will begin its transit at 10h. 5m. P.M., followed by its shadow at 11h. 13m. The visibility of the egress of the satellite is very doubtful. On the 22nd Satellite III. will enter on to Jupiter's face at 9h. 39m. P.M. Then the ingress of the shadow of Satellite II. will happen at 10h. 7m., the satellite casting it passing off the opposite limb of the planet at 10h. 21m. At 10h. 36m. 7s. Satellite I. will reappear from eclipse; and at 11h. 45m. Satellite III. will leave the disc of Jupiter. On the 29th, the transit of Satellite II. begins at 10h. 12m. P.M.; and finally, on the 30th, the shadow of Satellite I. will pass off at 9h. 50m. P.M. Saturn, for the observer's purpose, has left us until the autumn. Uranus may still be picked up immediately the twilight is deep enough to the S.W. of γ Virginis; but he is very near to the horizon. The Moon is full on the 5th at 10h. 38·3m. P.M.; enters her last quarter at 1h. 34·8m. P.M. on the 13th; is new at 10h. 52·8m. A.M. on the 21st, and enters her first quarter at 10h. 1·0m. A.M. on the 28th. Five occultations of fixed stars by the Moon will occur during June at convenient hours for the observer. On the 2nd, 94 Virginis, a star of the 6th magnitude, will disappear at the dark limb of the Moon at 8h. 29m. P.M. at an angle from her vertex of 335°. It will reappear at her bright limb at 8h. 39m. P.M. at an angle of 319° from her vertex. On the 4th, 49 Libræ, a 5¼th-magnitude star, will disappear at the dark limb at 7h. 55m. P.M. at an angle of 345° from the vertex of the Moon. It will reappear at 8h. 30m. at her bright limb, at a vertical angle of 284°. On the 5th, 29 Ophiuchi, of the 6th magnitude, will disappear at the dark limb at 8h. 52m. P.M. at an angle from the Moon's vertex of 60°. The Moon, however, will be so nearly full that the effect will be that of a disappearance at her bright edge. The reappearance at her really bright limb occurs at 9h. 59m. P.M. at an angle of 224° from her vertex. On the 6th, B.A.C. 6081, of the 6th magnitude, will disappear at the bright limb at 8h. 40m. P.M. at a vertical angle of 20°, reappearing at the dark limb at 9h. 39m. at an angle from the vertex of 258°. Lastly, on the night of the 10th, 45 Capricorni, of the 6th magnitude, will disappear at the Moon's bright limb at 11h. 49m., at an angle of 42° from her vertex; to reappear at her dark limb 53 minutes after midnight at a vertical angle of 275°. At noon on the 1st the Moon is in Virgo, across which she is travelling until 3h. A.M. on the 3rd, when she enters Libra ("The Seasons Pictured," plate xxvi.). She remains in Libra until 10h. P.M. on the 4th, at which hour she arrives at the boundary of the narrow northern spike of Scorpio. She has traversed this by 6h. 30m. the next morning, and emerged in Ophiuchus, her passage through which is completed by 9h. P.M. on the 6th, when she crosses into Sagittarius. She is in Sagittarius until 5h. 30m. A.M. on the 9th, and she then enters Capricornus ("The Seasons Pictured," plate xxi.). Her journey through Capricornus ends at 7h. A.M. on the 11th, when she crosses the boundary into Aquarius, and she quits Aquarius in turn for Pisces at 10h. A.M. on the 13th ("The Seasons Pictured," plate xxii.). It is not until 4h. P.M. on the 16th that she has traversed this great straggling constellation and entered on the northern confines of Cetus. She leaves this outlier of Cetus at 6 o'clock the next morning, and enters Aries. By 10 A.M. on the 18th her journey over Aries is completed, and she passes into Taurus ("The Seasons Pictured," plate xxiii.). As she travels through Taurus, she reaches, at 4h. 30m. A.M. on the 21st, the edge of the northernmost portion of Orion. It takes her just 12 hours to cross this, and she then emerges in Gemini ("The Seasons Pictured," plate xxiv.). She continues in Gemini until 9h. 30m. A.M. on the 23rd, at which hour she enters Cancer. She passes from Cancer into Leo at 9h. 30m. P.M. on the 24th, and is in Leo until 10h. A.M. on the 27th, when she passes into Virgo ("The Seasons Pictured," plate xxv.), and this she quits in turn for Libra at 10h. A.M. on the 30th, her passage across the whole width of Virgo thus occupying exactly 72 hours ("The Seasons Pictured," plate xxvi.). She is still in Libra at midnight on the 30th.

Our Chess Column.

BY "MEPHISTO."

POSITION in a game played in a handicap tournament at the British Chess Club, White having received the odds of two moves at starting.

L. HOFFER.
BLACK.



WHITE.
WAINRIGHT.

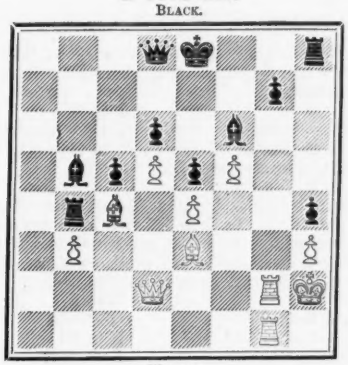
White played	
R × P	R to Q7 (ch)

If B × R, then Q to Kt6 (ch) would win.

Q × R	B × R
Q to Q6 (ch)	K to B sq
R to QR sq	R to Q sq
R × B	R × Q
P × R	Q to B3 (ch)
K to Kt sq	Resigns.

Position in a game played, at the odds of two moves, between Messrs. Mills and Gunsberg.

I. GUNSBERG.
BLACK.



WHITE.
D. Y. MILLS.

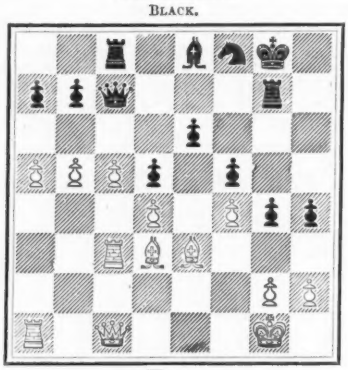
As may be seen from this position, Black was too intent upon gaining an advantage on the Queen's side, and did not sufficiently heed his opponent's doings on his K side, the result being that White now won as follows:—

B to Kt5	K to B sq
Black had no satisfactory move.	
B × B	P × B ?
Q to R6 (ch)	Resigns.

Position, after the forty-first move, in the second game of the match Blackburne *v.* Zukertort, played at the British Chess Club, May 9, 1887.

BLACKBURNE.

BLACK.



WHITE.

ZUKERTORT.

The game proceeded in the following very interesting manner:—

42. P to R6 !	P to Kt3

The alternative moves of P × P. 43. R × P would have led to a loss by a slow process, as White would three times attack the black RP, which could not be effectively defended.

43. P × P

Both White and Black must have expended a good deal of thought on their last moves. Black has no alternative now but to accept the consequences.

	Q × R
44. Q × Q	R × Q
45. P to Kt7	R × B

Kt to Q2 would not prevent the Queening of the Pawn, as White would reply to this with P to Kt6 !

46. P (Queens)	R × B

47. P to Kt6 !

All this is very fine and strong, and the reader must be puzzled to know how such a game can be lost.

	P to Kt6
48. Q × B	P × QKtP

49. P to R3

49. P × P was much simpler, and created less of a block if R(K6) × P then R to R2, and advances the QRP.

R to QB2

Taking the best advantage of the position, and threatening to come down with his Rooks as a last desperate chance, especially as the Kt effectively protects the K against the Q.

50. Q to Kt8

White should not have allowed Black to double his Rooks on the 7th row, as then the game becomes very difficult. Two moves can be played by White—either 50. Q to KR5 or Q to QR4; the former would most likely lead only to a draw, whereas the latter holds out good hopes for a win.

R to R6 !

This move must have been overlooked by White, who probably calculated on R to B7; 51. P to R7, R to K7; 52. Q × Kt (ch); K × Q; 53. Q(Queen) (ch) and wins.

51. R to KBsq

A bad move on any consideration. Black's intention to double his Rooks on the 7th file by R to B7 and R7 is too obvious to be overlooked, therefore the R should not have blocked in the K if 51. R to Kt sq; then Black would probably draw by R to B7, 52. P to R7, and then either Rook to R7 should draw

	R to B7
52. Q to Q8 ?	QR to R7
53. Q to Kt5 (ch)	K to B2
54. Q to R5 (ch)	Kt to Kt3
Resigns ?	

Undoubtedly Black has conducted the ending exceedingly well under very difficult circumstances, but although he has gained a considerable advantage through White wasting time with his R and Q, there was *no occasion at all* for White to resign immediately; on the contrary, he still had some good chances of playing for a draw. We can only account for White's resignation in a match-game that he must have been under the impression that Black could force a mate, which, however, is not the case. It is no good playing 55. Q to B3, for Black would answer with Kt × P !—winning. But supposing

55. R to K sq	R × P (ch)
56. K to R sq	

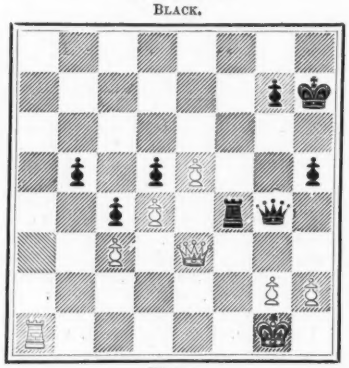
and we see absolutely nothing else for Black but to endeavour to win by capturing White's KBP.

There are many other lines of play possible, most of which, however, lead to a draw. In some instances even White threatens to win by R to QB sq; as, for instance, if Black plays R to R7 (ch), 57. K to Kt sq, R × P, 58. R to QB sq. There is also the P on R6, which would aid White; and, considering the difficulties and chances of practical play, White's game was, as Mr. Gunsberg pointed out, by no means hopelessly lost.

Position in the third game of the match, played May 11, 1887.

ZUKERTORT.

BLACK.



WHITE.

BLACKBURNE.

Zukertort played	P to Kt5 ?
P to R3	Q to Kt4
R to K sq !	

And White must win, for he cannot be prevented from advancing his KP.

	P × P
P to K6	P to B7
P to K7	R to K5
Q × Q	R × R (ch)
K to B2	Resigns

For if P (Queen's), then White plays Q × Q, and wins.

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